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THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

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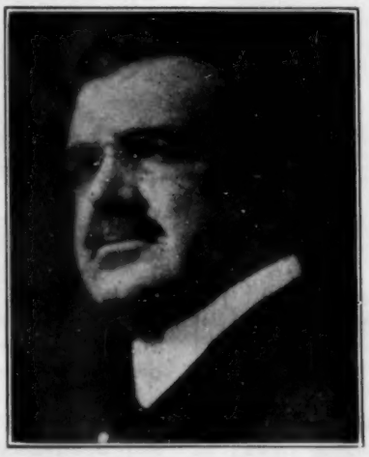
Progress of the Brass and Copper Industry

How the Rolling Mills Have Gone Forward and Their Future Possibilities

Written for The Metal Industry by W. A. WOOD, Consulting Engineer



W. A. WOOD

Due to the stress of providing and equipping the armies of the allied nations during the late war great progress was made in manufacturing processes and equipment. In many arts new processes were discovered and manufacturing was impelled to volumes never known before. The demand was for material, and always more material.

This forced condition has been of real benefit in many cases, as the arts have made much faster progress than would have been possible in the same length of peace period.

It seems strange, however, that the older the art, the slower the development, and the less the tendency to break away from old established methods, many of which are not only traditional but literally covered with moss. It certainly cannot be defended by the saying "the wisdom of age versus the enthusiasm of youth." Much more progress will be made in working out a new problem than correcting an old one. Our industries today give many evidences of this fact.

We are concerned in this article with the copper and brass industry; what progress and how much has been made in the last thirty years. As an industry it is only antedated by the Stone Age and there are still reputed to be "lost arts" connected with it. History is filled with it and our museums attest the ancients; labor, skill and conceptions. One might well take the diary of Benvenuto Cellini and read through his fascinating word picture of the casting of one of his immortal bronzes; sculptor and caster, sick with a fever, short of spelter, and the shop afire, a successful superman!

Comparisons are at times odious but one cannot think of the copper and brass industry without thinking of the steel industry, an industry that has gone out of bounds, so to speak, in originality and volume. Copper and steel differ of course as metals, but have kindred shapes and processes and on the whole are closely related. The difference is largely in the volume of demand. The refinements of manufacture are however more exacting in the copper than in the steel industry. It is generally believed that the steel industry stands for volume and the copper industry for quality; so much so that mill hands are not interchangeable, nor can the two metals be interrolled in the same mill satisfactorily.

This, however, does not prevent the economies of steel from being applied to copper. We are, of course, conceding the activities of the steel industry and their radical spirit. Conservatism has been a cardinal "virtue" of the copper industry. The revisions, improvements and creations have been made dynamically by those few who dared, sometimes with much jeopardy.

There are many more mills today than there were thirty years ago and geographically, they are much better located. We believe that tradition and romance has kept the bulk of the copper and brass manufacturing in Ansonia, Waterbury and Torrington. As a matter of economy, and for national defence it does not belong there. Other industries have scattered their plants to locations consistent with demand and supplies. The copper and brass industry has made similar moves at such centers as Rome, Buffalo, Detroit, Kenosha and Montana with other centers in prospect. Volume and character of demand and freight are having their telling effect. The creation of the American Brass Company and its absorption by the Anaconda Copper Mining Company have made for the stability of the industry, and should result in many innovations and further combinations.

There is a movement and inclination on the part of large consumers to manufacture brass and copper products for their own needs. This is bound to affect the whole industry and must be of considerable concern in many quarters.

I believe the copper and brass industry suffers in comparison to the steel industry in its attitude to the value of technically trained men among its executives. Ability

to sell and acquaintance with customers is recognized more than four years at Massachusetts Tech. It is a glaring traditional fault of the industry.

Electricity has left its impress on the industry in a thousand ways and with few exceptions it has become fully electrified. Typical of the power application in 1896, the Wallace plant at Ansonia had some fifty odd steam engines together with a half dozen bi-polar dynamos, belt driven, for lighting. Next door was that splendid new mill of the Ansonia Brass & Copper Company driven by a two thousand horsepower cross-compound Corliss engine through a pair of eleven foot machine spur gears, 8" pitch by 24" face and a jack shaft some five hundred feet long running from 20" diameter at its gear to 8" diameter at the extreme end. Today the unit system of electric transmission is compulsory for convenience, efficiency and control.

Much progress has been made on the metallurgical side, with the result that the casting and treatment of metal approaches a real science and has been weaned away from the old rule of thumb methods that hung like a pall over the whole industry.

No better example could be given than the modern brass casting shop with its electric furnaces, displacing with a clean sweep the "all-important" caster and helpers with their crucible fires, and ancient legerdemain. The old time boss caster certainly was a thorn in the flesh.

The extrusion process has been an innovation together with its side partner, hot pressing. The process, as acquired by the Coe Brass Company of Dick of London was very crude, necessitating as it did the heating of the metal in a crucible and then pouring into the container awaiting the proper temperature before applying pressure, with the result that many charges froze in the container. It was only commercialized when billets were cast and then properly heated in a furnace.

The piercing of billets for tubes together with the subsequent drawing has about stood still. The automatic forming of brazed tubing has made some gains. The general equipment of the tube mill remains just about the same. The industry seems to have considered the making of tubes a necessary evil and has bent its energies elsewhere. The rolling of hot copper has made considerable progress both in rods and shapes.

The development of hot-rolled commutator copper at Ansonia was a marked advance in the art. Automatic pickling and the tinning of strip copper has made some progress. The automatic coiling and blocking as developed at Torrington has given a great impetus to production and the prevention of the many annual accidents. The heat treatment of metal, particularly in heating and annealing, has been revolutionized, resulting in fuel and operating economies and improved quality. The chemical and physical laboratory has come into its own and is as necessary as a power plant.

Copper clad steel has made a creditable bid for popularity both in sheets and wire, and although, at the beginning, showing some defects due to being an entirely new art, has such inherent merit that it must be seriously considered by the industry and given an important place.

Due to the electrification universally of everything possible, the greatest activity for sometime has been in rod, wire and cable (bare and insulated). Many new mills have been built to meet this ever increasing demand and much progress has been made both in equipment and production. Considerable progress has been made in hot rolling towards an automatic mill of large production. One mill is now under construction that will approach an automatic continuous mill very closely.

Wire drawing machinery has never been standarized and there are as many schools of opinion as there are types of machines. Stranding is in better development and much progress has been made in the stranding of medium size and fine wire. Insulating and lead covered cable operations have gone forward.

I believe there are revolutionary changes possible in the present-day sheet brass and copper mill that would effect every mill. The copper and zinc producing companies should supply standard slabs of standard mixtures with and initial breaking-down rolling operation together with overhauling. The economies are apparent on both sides, particularly to the mill.

A hundred years ago the Waterbury Brass Company had a mill on the hill back of Waterbury that was typical of every sheet brass and copper mill in the country today. They had to take care of sheets and strip both narrow and wide, universal mills so to speak, good for everything, and out of size as a specialty.

One brass mill looks like another, whether it is in New England or the West; tremendous investment in equipment, used once a month, or more likely once a year.

The average width of metal produced by any of the large mills approximates four inches. There is a volume of business in this and narrower widths in several sections of the country. **The thing to do is to build special mills for these sizes using narrow face rolls with stocky necks, rolls in tandem and automatic, and with automatic handling.**

I have seen the layout of a mill with a combination of breaking down, running down and finishing rolls together with annealing furnaces all in tandem, and automatic, that was far from a dream. This mill came near having its existence in New Haven during the war.

Another radical mill for the production of "copper weld," (copper clad) steel as a substitute for cupro-nickel for bullet jackets for the U. S. Government, to cost nearly three million dollars and to produce two hundred thousand pounds of metal per day, was stopped only by the Armistice.

The industry would have learned something from these automatic mills, as they were both absolutely revolutionary and were warranted under the stress of war conditions. However, I believe that with the new combinations, together with competition, the industry, in its search for economies, will create processes that will be a great step in advance.

Gold Beating

The ribbon of gold is rolled from the ingot by machinery and comes out 1¼ ins. wide and about 1-1,000 of an inch in thickness, the weight of two yards being about 1 oz. From this point every part of the work is done by hand. It is stated that all attempts to produce gold leaf by machinery have failed. The ribbon is cut into squares and is then placed between leaves of vegetable parchment and beaten with a 20-lb. hammer. Having been quartered with a "skewing" knife, the leaves are placed between the skins of a shoder (800 strong skins 4½ ins. square) and the shoder is beaten for two hours with a hammer weighing 12½ lbs. Quartering with the sharp edge of a split malacca cane follows, and the quarters are placed in a mold consisting of 1,000 very thin sheets of goldbeaters' skin 5¼ ins. square. The mold is only 1 inch thick and when filled with gold weighs only a few ounces. Five hours' steady beating with an 8-lb. hammer reduces the gold to its final thickness of about a 280,000th of an inch, when the leaves are trimmed and placed between leaves of paper in books. From the ribbon to the finished leaf the gold is not touched by hand, but is manipulated with boxwood pincers and all the cutting is done with cane tools.—G.

Building a Large Cable Plant

Progress of the Western Electric Works, Kearny, New Jersey

In the construction of the Western Electric Kearny Works on the sixty acre tract of marshland situated at the confluence of the Passaic and Hackensack Rivers about midway between Newark and Jersey City, unusual methods were employed.

The units now being built required 38,000 piles, subsequent units will bring the total number up to 200,000.

Construction as started consists of the power house with a capacity of generating 6,500 KW. (but with provision for a future 20,000 KW.); a coal and ash handling structure and a one-story and basement cable plant 437 x 454 feet; a series of six-story buildings that cover 693,000 square feet, and a bulkhead 1,734 feet long.

The site for part of the cable buildings and all of the power house were located in the water area, but as it was desired to erect the buildings as quickly as possible construction was started without waiting for the bulkhead.

The contractor doing the excavation work for the cable

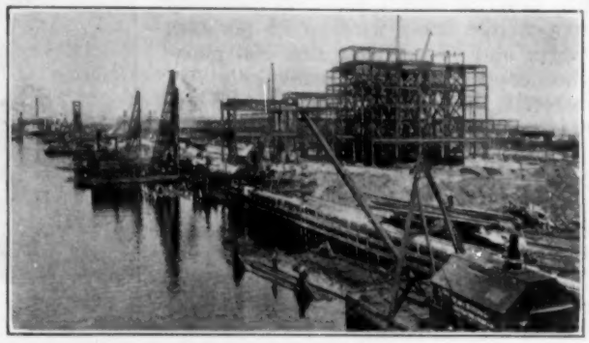
FOUNDATION PILES OF BUILDING 35 W.

plant found it possible to save the river sand and to use it for back filling. This eliminated the necessity of wooden forms for the basement floor as the basement slab concrete 6 inches thick was placed directly on the backfill in most cases. Where there was not sufficient sand for topping purposes and where the backfilled soil was in a muddy condition concrete was poured over it and allowed to set for at least 24 hours before the reinforcing bars were placed and the slab concreted. This same method was also used for the bottom of the footings.

The construction of the foundation for the six-story buildings was attacked in a somewhat different manner from that of the cable plant building foundations. The deviation in methods was due to two primary reasons. One reason was that the difficulty experienced in excavating around the piles in the cable plant building indicated that if the piles could be driven to cutoff grade (+ 2.5) instead of surface grade (approximately + 7.0) the excavation could not only be expedited but could be done much more economically. The other reason was that only a small portion of the site of the buildings had been filled with a topping of river sand, therefore the soil was not satisfactory for backfilling and could not be used for supporting the basement floor slab.

Four steam drivers with hammers weighing 6,450 pounds, with an impact of 7,727 ft.-lb. per blow were used for driving the piles. The drivers were lined up abreast and it was a common sight to see one machine driving piles 20 feet long and another machine but 40 feet away driving a pile 45 feet long. With the quartette of pile drivers as many as 275 piles were driven in one day.

Approximately 300,000 cubic yards of sand and mud were dredged from the river in order to obtain 20 feet of water along the bulkhead. The mud and sand were pumped to the adjacent marshland with leads of 2,000 to 3,500 feet in length. The bulkhead was designed however for a future depth of 30 feet.



GENERAL VIEW OF PLANT

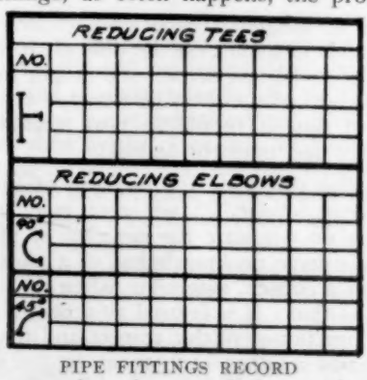
The Kearny Works, with the sole exception of the company's Hawthorne Works in Chicago, will be the largest telephone works in the world. It is planned ultimately to provide working quarters for 30,000 people.

The designs of the cable plant and the six-story building were made by the engineering and architectural forces of the Western Electric Company, Incorporated, and McKenzie, Voorhees and Gmelin of New York, consulting architects. The power house was designed by J. G. White Engineering Corporation of New York as consulting engineers, and Charles W. Staniford, 50 Church Street, New York, acted as consulting engineer on the bulkhead and building foundation design and construction.

A Kink for Checking Materials

Here is an ingenious and simple method for keeping a record of pipe fittings, developed by an engineer.

For example, where reducing tees have three different sizes of openings, as often happens, the problem of re-



PIPE FITTINGS RECORD

cording those openings in an orderly manner has heretofore always been a stickler. The accompanying reproduction of a blank used by this engineering concern shows how easily it can be done. Similarly, reducing elbows and return bends can be checked or recorded on the same blank.—W. F. SCHAFHORST.

Annealing Brass and Bronze Wire

Suggestions for Eliminating Rough and Scaly Spots in Wire

Written for The Metal Industry by W. J. PETTIS, Rolling Mill Expert

Q.—We have here a wire drawing mill producing phosphor bronze as well as brass wire, devoted to the manufacture of Fourdrinier cloth used in paper mills. The phosphor bronze wire consists of an alloy, 93 per cent copper, 6 per cent tin and 1 per cent phosphor copper; the brass wire, of 75 per cent copper and 25 per cent zinc and phosphor copper. We are using only A-1 materials, electrolytic copper, zinc and tin, the latter being "Banca."

W. J. PETTIS

In the foundry the metals are cast in plates, the same later on being rolled down to certain thickness in order to make it possible to obtain suitable material for cutting before it will pass different machines, producing different sizes of wires. In course of rolling, cutting and drawing, the plates as well as the wire will at intervals be annealed in order to make the goods more malleable. This process will take place about 20 times before the wire will reach 0.20 mm.

The phosphor bronze wire seems generally to be smooth and ductile. The brass wire, however, proves to be rough. We therefore think that some trouble is to be found through the repeated heatings.

A—Conditions that might cause the finished brass wire to have a "rough surface" are possibly the annealings received during the reducing process. Annealed at too high a temperature or for too long a time the result is the copper-zinc alloys will have what the trade terms "orange skin." That is, the finished brass surface will be identical in appearance to the skin of an orange. Laboratory tests have shown that 450° to 550° will give a normal grain structure in the alloy you are using. In practice, using a pyrometer controlled furnace, the pyrometer readings in most cases must be used as a comparative figure and the time element can only be determined by actual study of the furnace operations, the method employed in charging the furnace with the wire to be annealed, the amount charged, etc.

With the accumulated experience, which must be at your command, it should not be difficult to determine by the process of "trial and error," the proper muffle temperature, the weight of metal to be charged at one time and the length of time it should be heat treated in order to give a proper and uniform anneal.

We note that you state the mixture of the brass wire as 75 per cent copper, 25 per cent zinc and phosphor copper. You do not state the per cent of phosphorus in the alloy. We have no knowledge of a phosphor copper being used in a copper, zinc alloy when the zinc contents are as high as this. If it is used as a deoxidizer the zinc has already functioned in this respect and the phosphorus will simply add another component to the alloy, which will change the crystallization, making the metal more brittle; and in addition will give the surface a rough, scaly appearance.

Unless it has been proved that the addition of the phosphorus is necessary in the wire used in the manufacture of the Fourdrinier cloth, we would leave it out. In view of the fact that over-annealing is so easily corrected, and that your operating staff must have the knowledge, we are inclined to think that the addition of the phosphorus is causing the rough surface. In the 93 per cent copper-tin alloy the addition of the phosphorus as a deoxidizer is necessary and a real benefit.

Regarding the temper of the finished wire made of this alloy which you state should not be too hard or too soft (which we judge to be about ¼ hard), this temper can be obtained by annealing the metal dead soft and giving a finishing draw with a very light reduction, one number or less. This can be determined by trial pieces and would give all your products of the wire a more uniform temper than can be secured by annealing the finished wire. The phosphor bronze wire would not be affected by the heat treatment as readily as the brass wire.

Research in Making Gold

Professor H. H. Sheldon, of the department of physics of New York University, has begun a series of experiments under the direction of The Scientific American, in an effort to convert quicksilver into gold and confirm, by a different process, the results said to have been achieved by Professor Adolph Meithe during the last year at Charlottenburg Technical College, Berlin.

The problem, as E. E. Free, editor of The Scientific American, sketches it, is this: an atom of gold is possessed of seventy-nine electrons, while an atom of mercury has eighty electrons; knock off one mercuric electron and the result will be gold. This is what happened accidentally in Professor Meithe's experiment, Mr. Free said, and what he and Professor Sheldon hope to do deliberately. Their first objective is the transmutation of a half ounce of mercury into a little less of gold.

They will use the quartz lamp, a sort of stone electric light bulb, through which the German professor says he produced gold. He was working with mercury and the violet ray and after 200 hours found that a black film on the interior of the lamp interfered with his experiment. He scraped the film, tested it and found it to be gold.

Professor Nils Bohr, head of the department of theoretical physics at the University of Copenhagen, laid down the theory of electrons in atoms, which made Professor Meithe's work possible. He pointed out that the essential difference betwen the atoms of any two elements consisted in their electronic force. Recently Japanese scientists also have claimed the production of gold through disintegration of another metal.

Accurate records will be kept so that an estimate of the cost of producing gold may be made. They will try to estimate the time, if ever, when the world will have to face the threat of cheap gold. The Scientific American will publish results of the investigation as they become public, unless as a matter of public policy it seems wise to delay their publication.

Metals in 1924—Outlook for 1925

Copper, Brass, Zinc and Aluminum Discussed by Leading Authorities

Copper and Brass

By R. L. AGASSIZ,
President, Copper & Brass Research Association

The outlook for the copper industry during 1925 is, in my opinion, most encouraging. There are no indications of any abatement in the domestic demand for the metal, while the situation abroad is steadily improving. Copper has been slower in recovering from the ravages of the war than most American commodities, but its progress over the past two years has been steady, if somewhat halting at times, and accompanied by signs of health.

The statistical position of copper at this time is worth noting. The domestic consumption in 1923 was the largest in the history of the industry; nearly one and one-half billion pounds. This year's consumption has been going at even a higher rate. In spite of the fact that production has increased very materially, the total stock of available copper has decreased considerably since January 1, 1924, owing to the large refinery deliveries.

During the last three pre-war years we exported an average of about eight hundred million pounds per year; it looks as if our exports this year (1924) would exceed one billion pounds, and this in spite of the fact that Germany, who used to be our biggest customer, is probably taking only about two-thirds of what she had in pre-war years. It is hard to tell exactly how much, as Germany probably got a good deal of copper, especially in 1913, through Holland. Now Germany, according to the best information we have, needs a great deal of copper for her own internal use, so with the working out of the Dawes plan I look for increased exports in 1925. With world production and consumption of copper running pretty close together at the present time, and increased production on any very large scale unlikely, the outlook for the future has very encouraging aspects.

Nothing could be more satisfactory than the domestic situation, so far as consumption is concerned. Not only has this greatly increased in those fields in which copper and its principal alloys, brass and bronze, have usually dominated, but extended uses have been developed and research now under way is aiming at new applications of the metal. There is today organization behind the copper industry, effort in which producers and consumers have joined hands and made a common cause. This work is proceeding systematically and producing results; has been, in fact, a very substantial factor in the greatly increased domestic consumption.

Zinc

Written for The Metal Industry by STEPHEN S. TUTHILL, Secretary, American Zinc Institute, Incorporated

According to the United States Biennial Census of Manufactures for 1923, establishments engaged in the smelting and refining of zinc reported products valued at approximately $95,000,000—an increase of 151.3 per cent compared with 1921, the last preceding census year. Naturally, there was also a commensurate increase in the production of zinc ore. There is every reason to believe that 1924 in the American zinc industry will exceed 1923 in value.

Two outstanding features of 1924 were (1) the high water mark in the sales of Joplin zinc ore and (2) a shipment of slab zinc from plants for export in excess of 80,000 tons, or more than fifty per cent over 1923.

The activity of the American Zinc Institute is its steady advocacy of the standardizing and trade-marking of zinc coated articles of all kinds.

The present agitation for zinc coating standards dates from the conference brought about by the Institute with the National Association of Sheet and Tin Plate Manufacturers at Pittsburgh in the summer of 1923. Shortly thereafter that Association surveyed its industry. Last Spring the Sheet Steel Executives voted at their White Sulphur Springs meeting to work out their problems through a Sheet Steel Trade Extension Committee. This committee's first use of printers' ink, in December, stated that it was "not entering upon an advertising campaign but a business enterprise." The committee welcomes suggestions and criticisms.

The Galvanizing Committee of the Institute, of which Past President F. C. Wallower is chairman, is in intimate contact with this Sheet Steel Trade Extension Committee.

On the technical, or scientific, side of this question, the Institute is represented at all times by the Chairman of its Development of Industry Committee, Mr. George C. Stone, whose points of contact are the Federal Specifications Board, the Bureau of Standards, the American Engineering Standards Committee and the American Society for Testing Materials. All of these organizations are efficiently interrelated in their work upon the various phases of the zinc coating problem.

One of the important matters which came before the 1924 Annual Meeting of the American Society for Testing Materials was the acceptance of proposed tentative specifications for hot dipped galvanized sheets. A favorable letter ballot on the adoption of Tentative Methods of Determining Weight of Coating on Zinc Coated Articles (A 90-23 T) was recently reported by the Society.

In the matter of the standardization of all zinc coated articles, undertaken by the American Engineering Standards Committee early in 1924, the American Society for Testing Materials has accepted sponsorship for the work and is now organizing a Sectional Committee on Specifications for Zinc Coating. The activities of the Sectional Committee will co-ordinate with those of Committee A-5 on Corrosion of Iron and Steel, which indicated in its report for 1924 that it contemplated undertaking comprehensive field tests at several locations, representing varying atmospheric conditions, of metal products coated by various processes. A special committee of Sub-Committee VIII on Field Tests has been appointed to actively develop these outdoor tests.

Plans for the first of these tests, namely, the exposure of hot-dipped galvanized sheets, now receiving the active consideration of the Committee, involve hot-dipped gal-

vanized corrugated sheets of several weights of coating, and flat sheets of several weights of coating erected similarly to the construction employed for freight car roofs. This construction is included to answer the question of the influence of cracking of the galvanized coating on the life of the coating. The Zinc used for the tests is to be in accordance with the A. S. T. M. specifications for Prime Western Zinc, with a tin content not over 0.5 per cent, free from aluminum. The complete program will include a total of 140 sheets for each set, 80 corrugated and 60 flat. It is expected to have the test racks erected next April.

In working on this galvanizing problem the national organization of the American zinc industry is not losing sight of the fact that 100 per cent sheet, strip and plate zinc have a great future, and the Institute is doing everything within its power to cultivate a sales field which has hardly been scratched as yet, especially in the field of building construction.

With two such promising fields of consumption, namely, zinc coating and pure zinc, under development, together with the world looking more and more to this country for its zinc supplies, the future of the American Zinc Industry appears to be exceedingly bright.

Aluminum

Written for The Metal Industry by ALUMINUM MAN

The review of the aluminum industry for the year 1923 viewed the future with uncertainty, which it turns out was justified by a depression existing throughout that year and during a considerable part of 1924. In fact, it was not until the last quarter of 1924 that there was sufficient improvement in the aluminum business to afford any encouragement, and this improvement was rather in the nature of a steady demand than an increasing demand. As a result of this depression, a number of the factories manufacturing aluminum or aluminum goods reduced their forces throughout 1923 and a part of 1924, or were entirely closed down. In fact, it is just now that the plants of the principal producer of aluminum in the United States are getting back to normal operation in the manufacture of crude aluminum.

As is likely to be true during periods of this character, the various manufacturers turned their attention to the stimulation of new uses and the development of those which had recently been inaugurated. It has been particularly notable that the use of aluminum bronze powder for paint has expanded greatly during the last two years and particularly during 1924. The use of this pigment as a weather protection in such places as steel bridges, structural work, tanks, tank cars, steel towers and steel smokestacks is becoming conspicuous due to the attractive appearance of the paint. It is claimed that aluminum paint is beneficial not only because of its protective qualities but due to its heat reflective property, thereby lessening evaporation loss due to the lowering of the internal temperatures of containers. The characteristic color of this paint is also highly recommended for interior use in warehouses, shops, laboratories and similar places, on account of its light reflecting prisms. The combination of this property with the protection to steel afforded by aluminum paint is an ideal one for buildings located in a smoky, murky atmosphere such as is so frequently the case with manufacturing plants.

The Aluminum Company of America reports the electrical conductor business as being good and that the demand for aluminum steel-reinforced cable has been more satisfactory than with most of their fabricated business.

The field of strong alloys has received special attention throughout the year in such uses as forged parts for connecting rods and other automobile parts. These have been adopted by a number of automobile manufacturers as standard equipment. Airplane propellers have spun their way to fame in some of the races where records have been set, and the ZR-2 and the ZR-3 owe, it is claimed, a large part of their success to the strong aluminum alloys from which their structural parts are fabricated. In fact, the wide field opened up by the strong alloys of aluminum, at the time when navigation of the air seems to be coming into assured success, would appear to be tremendous.

Silicon alloys for castings have also been more widely used during the past year as a corollary of the expansion of the die-casting industry. Die-casting and permanent mould casting of aluminum are really in their infancy and the development of low shrinkage aluminum alloys is bound to extend this field into one of the principal uses of aluminum.

One sees aluminum foil on all sides, although to the novice it is difficult to distinguish from tin-foil. The growth of this business, however, is reported to be steady and this method of employing aluminum is based upon such sound principles that it would seem to promise well.

Inquiry develops the fact that the aluminum cooking utensil industry has not enjoyed as good a year as would be expected for this most stable branch of the entire aluminum industry. Foreign importations have no doubt had their effect upon domestic manufacture and no doubt the wide-spread dullness of business, which toward the end of any period of depression is most keenly felt by the house-holder, has had its influence upon the buying of utensils by the housewife.

We spoke last year of aluminum screw machine parts, being the small ornamental or useful article turned out in large quantities by screw machines, which have heretofore for the most part been made in brass. It is claimed that the hard alloys of aluminum machine equally as well as brass and in some instances better. The color of aluminum recommends it for numerous uses in articles of this sort and the vast number of small parts entering into the multitude of household and electrical equipment which constitutes a part of our everyday life assures a wider use of aluminum for screw machine parts.

One of the striking developments in aluminum is the rather bold effort of its proponents to employ it in places where heretofore steel or wood has seemed to be the only suitable material. The most striking case is in the use of aluminum for steam railway cars. One of the large railroads of the country has built a number of aluminum cars, thereby reducing the weight of the car by about three tons. Also, in automobile buses, which are becoming such a standard form of transportation, aluminum is being employed more widely than ever for the purpose of reducing weight. If it can be shown that aluminum withstands the severe strain which is placed upon any material employed in the transportation of people, and at the same time guarantees an economy in weight carried, its future in this field would seem to be assured.

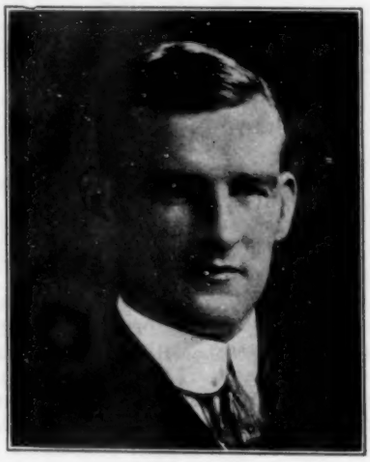
Aluminum manufacturers report that the outlook for business for 1925 is encouraging and along with all other manufacturers they are looking forward to a good year.

Admiralty Nickel

A New White Metal Alloy for Corrosion and Heat Resistance*

By W. B. PRICE,
Chief Chemist and Metallurgist, Scovill Manufacturing Company, Waterbury, Conn.

Admiralty nickel, a new corrosion and heat-resisting white metal alloy developed by the writer and given the abbreviated name "Adnic," contains 70 per cent of copper, 29 per cent nickel and 1 per cent of tin. It is so called from the fact that the proportions of copper and tin are the same as those in regular Admiralty condenser metal, with twenty-nine per cent of nickel replacing the same percentage of zinc.



WM. B. PRICE

The alloy has been very successfully used for the manufacture of diaphragms, and has proved to be the only non-ferrous alloy in wire form that will successfully produce the perfect glass beads required for artificial pearls.

Many alloys used in corroding media or at elevated temperatures are refractory, and can only be had in the cast form, but "Adnic," on account of its remarkable ductility can be drawn, stamped and spun.

Since this metal is especially adapted for the manufacture of diaphragms and was developed for that purpose, a description of its use in diaphragm-operated valves may be of interest.

Thermostatic devices functioning by fluid pressure consist in the assembly of a number of diaphragms or a corrugated bellows forming a chamber which contains the thermostatic fluid. Expansion or contraction occurs with the variation of temperature in the surrounding medium, increasing or decreasing the pressure of the fluid within the chamber. As long as the joints in the thermostat can be maintained tight the fluid pressure will bear a constant relationship to the external temperature.

Variations in the characteristics of the metal due to temperature and operating strains have been and still are continual source of trouble to manufacturers of thermostatic devices. It is found that a thermostat which functions perfectly when new will, after a short time, operate prematurely. This is due to annealing of the metal by prolonged exposure to high temperature and, in the case of some alloys, due to the rapidly repeated movements to which the metal is subjected. In an attempt to overcome the latter difficulty, the diaphragm metal is frequently made harder and this in turn leads to breakage.

Extensive tests have shown the copper-nickel-tin alloy to meet the requirements far better than any other alloy investigated within a period of three years, these including phosphor-bronze, nickel, nickel-silver, cupro-nickel, Monel and intermediate compositions.

The usual testing method is as follows: Each thermostat to be tested is carefully micrometered and observation made as to its expansion under various internal pressures. It is then placed on a header and immersed in an oil bath at a temperature of 350° F. By means of a reciprocating valve, thermostats in four groups of 16 each, are alternately expanded and contracted—the former being caused by admission of air at a pressure sufficient to completely expand the thermostat and the latter by the quick release of air allowing the diaphragms to contract. The rate of expansion is 70 per minute for eleven hours per day. At intervals of 100,000 operations, the thermostats are removed and retested for permanent set and expansion under various pressures; this is repeated until such time as a permanent condition is reached (usually between 200,000 and 400,000 operations). After reaching a permanent set, the thermostats are tested to destruction without further observations. This test has been used for controlling the suitability of raw material.

In thermostats containing six diaphragms made from the copper-nickel-tin alloy, assembled into a single unit having an over all length of approximately 1¾ in., it is found that, after one to two million operations, there is an increase in length of only 0.018 to 0.033 in. and a softening represented by a pressure not exceeding 4 per cent less than the original pressure required to give the same expansion. Observations made after ten million operations show no deviation from these results.

* Discussion read at the June, 1924, meeting of the American Society for Testing Materials. Just released for publication.

Foundry Inspection Report*

A shop inspector is detailed to the foundry when heats are poured. He checks the weights of metal used, takes temperatures during melting, sees that test coupons are properly poured, identified and delivered for test, inspects castings on the foundry floor, and reports any difficulties or irregularities. Heats are serially numbered and every casting is marked with its heat number for future identification. The foundry inspector keeps a record of each heat as shown in the chart, and forwards duplicate copies to the chief inspector and metallurgist. Test coupons are pulled within 24 hours, and the results approved before the castings are released to the shop.

FOUNDRY REPORT

To Metallurgist—

Date .....
Heat No. .....
Specif. .....
.....

Metal Used	Pounds
Gates & Risers (Heat No....)	.....
Aluminum Sheet	.....
Copper Sheet, etc.	.....
.....	.....
.....	.....
.....	.....
Total	.....

Melting Record

	Time	Temp.
Start	.....	.....
.....	.....	.....
Max. Tmp	.....	
Finish	.....	
Pour	.....	.....

Test Coupons .....

The following castings were made:

Job Order	Part No.	Passed	Rejected	Remarks

(Signed) _____
Inspector

*From a paper on Aluminum Alloy Castings From Sheet Scrap, presented at the Joint Meeting of the American Foundrymen's Association and the Institute of Metals Division in Milwaukee, Wis., October 11-16, 1924. See THE METAL INDUSTRY, December, 1924.

Foundry and Mechanical Problems

Various Troubles in Casting and Working Metals

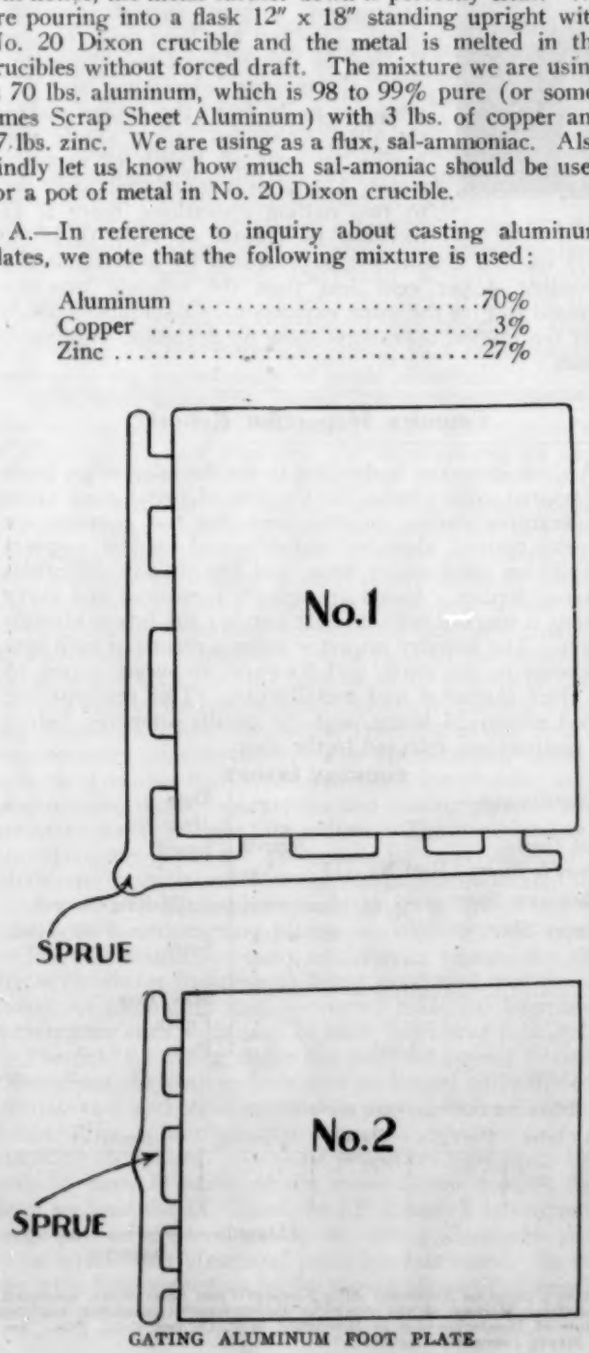
Written for The Metal Industry by Associate Editors and Specialists

Aluminum Foot Plates

Q.—We are having some trouble with casting aluminum foot plates and we would request you kindly to let us have a remedy for our trouble. We are mailing you a sample of one of the castings and you will note that where the pattern is gated, the plates show a lot of impurities in the castings which are always on top of the article. As you will notice, the metal further down is perfectly clear. We are pouring into a flask 12" x 18" standing upright with No. 20 Dixon crucible and the metal is melted in the crucibles without forced draft. The mixture we are using is 70 lbs. aluminum, which is 98 to 99% pure (or sometimes Scrap Sheet Aluminum) with 3 lbs. of copper and 27 lbs. zinc. We are using as a flux, sal-ammoniac. Also kindly let us know how much sal-amoniac should be used for a pot of metal in No. 20 Dixon crucible.

A.—In reference to inquiry about casting aluminum plates, we note that the following mixture is used:

Aluminum	70%
Copper	3%
Zinc	27%



GATING ALUMINUM FOOT PLATE

We do not think that this is the proper mixture for that class of work, and would suggest that they try No. 12 Alloy, which consists of:

Aluminum	92%
Copper	8%

A hardener is made of 50% copper and 50% aluminum and poured in ingots, and used as follows:

84% Aluminum is melted.
16% Hardener is added.

Stir well and add a small piece of chloride of zinc just before pouring, as a flux, and pour as cold as consistent with getting good castings—which should not be over 1,400° F.

We would also suggest that you pour your work flat and ram your mold good and tight around the edges and rather soft in the center, gate like the sketch.

If you must use zinc in your mixture, we would suggest that you omit the copper and use:

Aluminum	73%
Zinc	27%

and pour when not over 1,300° F. No. 12 Alloy, however, will give the best results.—W. J. REARDON.

Filling Imperfect Castings

Q.—We are very desirous of obtaining the proper solder for filling up small holes in nickel-silver, brass and bronze castings that will finish off and be of the same hardness of the original metal in the castings so that the articles can be nickel plated and not show where the spots are.

We have from time to time some castings on which considerable labor has been laid out that show small sand holes, which, if filled with the proper solder, could be polished off, but with the ordinary half and half solder or any solder of that kind that we have tried, still show the outlines of where this solder is filled in, because in polishing it off the solder, softer than the other metal, finishes down more quickly, leaving the outline of the small hole that is filled up.

Really, what we require is not perhaps a solder, inasmuch as it is not to join any two pieces together, but a filler or cement that will fill the hole and then can be finished over so as not to show the outline of same.

A.—The only solder that you can use on your castings to fill up the holes in the surfaces, is a low melting spelter composed of 2 parts zinc to 1 part of copper. The color will be gray. You will have to use a blow-torch or blow-pipe as it will not fuse with a soldering iron.

Your castings are coming from the foundry with sand holes or after machining, developing porosity. The place to eradicate your troubles is in the foundry. The gating of the casting should prevent the metal from washing the sand from molds when pouring. Oxidizing in melting and pouring at too high a temperature also produce porosity in castings. There is nothing on the market like a cement or filler for filling up holes in non-ferrous castings. There is a cement or filler used on iron castings.—P. W. BLAIR.

Babbitting Cast Iron

Q.—Can you give me some information on the method employed in babbiting cast iron. We are having trouble in the tinning of the castings preparatory to the babbitting process, after using a solution of sulphuric acid to dissolve the sand on the surface.

A.—Cast iron bearings that are to have a babbit lining should be well tinned. The castings should be free from sand, grease, rust or dirt of any kind and the best way to secure this condition is to immerse the casting in a pickle of hydrofluoric acid consisting of about fifteen parts of water to one of acid. Hydrofluoric acid is preferable to muriatic or sulphuric acids, commonly employed for the purpose, for the reason that it dissolves the sand instead of merely dislodging it, and does not attack the iron to the extent that the other acids do. The pickle should be kept warm by means of a jet of steam, the temperature ranging from 150 to 170° F. The bearings should be examined occasionally while in the pickle and any sand or black spots on the surface of the iron removed by means of a stiff wire brush. Care must be exercised to avoid overpickling as this will cause pitting of the surface. The length of time that the bearings should remain in the pickle will depend somewhat upon the strength of the acid and the temperature of the bath. The bearings should be rinsed thoroughly in clean water after the pickling operation.

Parts of the casting that are not to be tinned should be coated with a thin mixture of graphite and water. When dry, apply salammoniac to the surfaces to be tinned and immerse the bearings in a bath of molten metal consisting of equal parts of tin and lead. Babbitt metal should not be used for tinning purposes as it is not suitable. The bearing should be allowed to remain in the molten metal until it is hot enough for the tinning alloy to run off freely leaving a thin coating on the surface. It is preferable to babbit the bearing immediately after the tinning and before it loses the heat acquired in the tinning bath. Experience has shown that a perfectly good babbit can be made worthless by allowing it to become too hot.—P. W. Blair.

Brazing

At the meeting of the Birmingham (England) Local Section of the Institute of Metals held at the Chamber of Commerce on Tuesday, November 4th, under the presidency of Mr. W. R. Barclay, O. B. E., a paper was presented by A. R. Page of the Birmingham Small Arms Company, Ltd., on the subject of Brazing. Members of the Non-Ferrous Research Association and the Research Association of British Motor Manufacturers attended by invitation.

Mr. Page emphasized the importance of brazing to manufacturers of bicycles, motor-bicycles and automobiles, pointing out that the steel tubes were usually jointed by some non-ferrous alloy. The jointing was usually effected by one of three methods, either brazing, Hyde welding or soldering. In brazing the alloy used was generally copper and zinc, about 50 to 55 per cent of copper and 40 to 45 per cent of zinc. The heating was done with a blow pipe and either towns gas or producer gas and compressed air. The bath of molten brass was covered with a layer of fused flux, for example borax. In the Hyde welding process pure copper was used as the jointing material with a furnace maintaining an atmosphere of hydrogen. The last named system was restricted to articles of moderate size. Figures were given showing that in dip brazing a temperature of 970° F. was usual and there was a very considerable loss of zinc in the bath amounting to as much as 3.7 per cent on the first day. As a rule breakages took place away from the joint, failures of the joint being rare.

Brazed joints were stronger than hyde welded joints, restricting a strain of 9 tons per square inch as against 7 tons for hyde welding. The brazing process, however, was very unsatisfactory on account of the effect on the mechanical properties of the steel members due to the high local heating. The tensile strength was reduced and ductility was seriously impaired. Heat treatment was found to weaken the joint and was inapplicable to bicycle frames. It was very necessary to discover some solder or jointing material possessing a melting point considerably less than the ordinary copper-zinc alloy. The alloy should possess a melting point of about 500 enabling brazing to be done at 600 degrees. Borax was useless owing to its high melting point.

In the course of the subsequent discussion it was suggested that the weakening of steel was undoubtedly due to the different temperatures introduced which one speaker suggested caused local grain growth. Several speakers cited difficulties in connection with the use of borax and agreed that the ideal solder had yet to be discovered.—J. H.

Emery Knife Sharpeners

Q.—We are looking for a formula for making sharpening or emery bars with a wire shank, cast or baked in, used for sharpening knives, which retails in ten-cent stores.

A.—These formulae are all more or less secret and it is impossible for us to give you exact information. However, owing to the iron wire center, the article would have to be what is known as a silicate compound which, when baked at a temperature of 500-700° F. becomes very hard. It is from this class of material that the so-called rubber emery wheels or silicate wheels are made. All formulae pertaining to the art are more or less secret productions from the various wheel shops. The various abrasive manufacturers can help you.—W. L. Abate.

Cementing Porcelain to Brass

Q.—Kindly mail us whatever information you may have pertaining to cementing porcelain handles on to brass parts with sulphur.

A.—Have necessary racks or blocks suitably drilled to hold percelain handle in vertical position. Fill the handles with powdered sulphur 75 parts; plaster paris 25 parts. Heat the brass parts to about 250° F., so that when inserted the sulphur will melt, but with not enough heat to set it on fire. Do not disturb the parts during the cooling period. When cold they will be permanently set. Brass parts should have a thread or notch, or perhaps a flat part so that the cement can have a better hold on the material.—W. L. Abate.

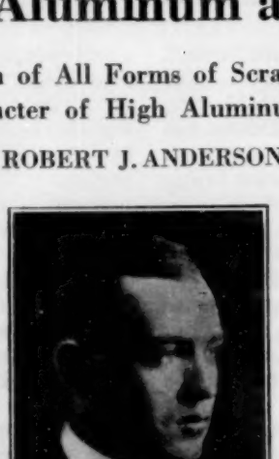
Smelting Secondary Aluminum and Aluminum Alloys

A Series of Articles on the Reclamation of All Forms of Scrap and Used Aluminum and Aluminum Alloys. Part 1. Kinds and Character of High Aluminum Scraps for Secondary Smelting.

Written for The Metal Industry by ROBERT J. ANDERSON, Consulting Metallurgical Engineer

INTRODUCTION

The production of secondary aluminum and aluminum-alloy pig from scrap and waste materials of high aluminum content has grown to be a large and important branch of the aluminum industry, and in the past ten years the consumption of secondary aluminum and aluminum alloys has increased rapidly. Of the secondary material recovered by smelting plants, part is recovered as secondary aluminum (i.e., 98-99 per cent aluminum), while part is recovered in the form of alloys. Thus in the ten-year period 1913-1922, inclusive, of a total recovery of 255,014,000 pounds of secondary aluminum and aluminum alloys 116,312,000 pounds were aluminum as such and 138,702,000 pounds were recovered in the form of alloys. The total value of this ten-year recovery was $91,295,320. While formerly, the recovery of aluminum as such was greater than that of aluminum alloys, during the past seven years the recovery of aluminum alloys has been the larger of the two.



ROBERT J. ANDERSON

Secondary aluminum is not necessarily inferior in quality to primary metal, although of course, it is ordinarily not so pure. The purchaser of pig aluminum should be concerned regarding its chemical composition, mechanical properties, and behavior in casting, rolling, or other manufacturing treatment, rather than as to whether it is primary or secondary metal. Of couse, for some purposes, secondary metal is out of the question.

In this article it is the writer's object to discuss briefly the nature and kinds of scraps and wastes of high aluminum content which arise in melting and manufacturing operations in the aluminum industry, and to indicate the characteristics, value, and availability of these scraps to the secondary smelter. In later articles, various other aspects of secondary aluminum and aluminum-alloy smelting will be discussed.

In the ordinary secondary smelting process for the recovery of aluminum scraps, no refining of the materials is possible, that is, it is not possible to eliminate various impurities from the metal as in the case of copper or lead. For that reason the composition of the scrap will determine the composition of the resulting pig. In dross smelting of course, separation is made of the free metal from the aluminum oxide, but the chemical composition of the pig will depend upon the metal in the dross.

In the United States, the smelting of secondary aluminum and aluminum alloys was formerly carried out largely by companies engaged in the smelting and refining of non-ferrous metals and alloys in general, i.e., so-called composition ingot makers, and while these firms still handle secondary materials of high aluminum content, there has been a marked tendency in recent years toward specialization in the aluminum end. There are now several fairly large concerns which specialize solely, or very largely, in aluminum and aluminum-alloy smelting. Also there is a noticeable tendency toward the installation of recovery plants by the larger motor-car makers. These concerns accumulate large amounts of aluminum-alloy borings in machining cast parts for cars, and the feeling is that where a fairly large amount of borings arises yearly, it is more profitable to install a plant for smelting them to pig rather than to sell this scrap to the secondary smelters, particularly in case the motor-car manufacturer operates an aluminum-alloy foundry. This tendency may eventually result in serious inroads on the business of the secondary interests. Secondary aluminum and aluminum alloys are smelted both here and abroad by producers of primary aluminum, i.e., where such producers are also fabricators (and this is generally the case), but the bulk of the recovery is made by the secondary smelters who purchase scrap in the market.

CLASSIFICATION OF HIGH ALUMINUM-BEARING SCRAPS

The principal forms available to the secondary smelter are as follows: drosses and skimmings, from aluminum melts; new aluminum sheet clippings and punchings, from punch press and stamping operations; painted aluminum sheet, from the junking of old motor cars and other sources; plain aluminum sheet (not painted), from various sources; discarded aluminum utensils; new aluminum "hay," from beading and trimming operations in producing various articles; and discarded aluminum wire, from various sources. Aluminum foil gathered largely through junk dealers forms a small source of material for smelting. Small stamped or pressed forms such as covers for jars, and novelties, ultimately find their way to the secondary smelter. In the case of aluminum scraps, exclusive of drosses and skimmings, it is presumed that the material will contain 98-99 per cent aluminum. In addition there are also collected borings, drillings, and millings, from machining operations, and discarded castings, principally from scrapping of motor cars. The bulk of the scrap on the market is in the form of borings and old castings.

ALUMINUM DROSS AND SKIMMINGS

Aluminum dross consists roughly of aluminum oxide, Al_2O_3, plus metallic aluminum mechanically entangled therewith. It is the scum or oxidation product removed from liquid heats of substantially pure aluminum, in melting practice, by skimming. (Such dross is referred to in British practice as aluminum swarf). The percentage of contained aluminum (i.e., metallic) in such dross depends upon the care with which the skimming is done and the flux used in melting. As is well known, when aluminum is melted in ordinary practice it is oxidized to some extent, and the total oxidation loss depends largely upon the temperature of melting and the constitution of the furnace atmosphere. The oxidation or dross loss on melting varies between about 0.75 and 5 per cent in actual practice. Normally, aluminum dross also contains aluminum nitride (possibly some aluminum carbide), silica, and other impurities. The aluminum con-

tent of dross or skimmings, i.e., the free metal, may vary from 5 to 60 per cent or more, depending upon the care used in skimming heats, the temperature of melting, and the fluxing.

Aluminum dross of varying grade arises also in smelting operations on aluminum scraps, but the bulk of this is a waste product. If the dross arising from smelting operations is skimmed into water while hot, it may contain a small percentage of mechanically entangled aluminum in the form of minute shotted globules; these globules can be screened from the bulk of the dross and recovered. If cooled in air, however, the metallic aluminum in such dross is oxidized, and the skimmed dross will contain no metallic aluminum.

Usually, aluminum drosses are sold to smelters for whatever price can be obtained, but in some cases such drosses are sold on contract. The price paid is very variable depending upon the free metal content and the amenability to smelting recovery, and ordinarily the price of each lot is settled individually. It should be stated in passing that the terms aluminum dross and aluminum skimmings are employed interchangeably.

ALUMINUM ROLLING-MILL SCRAP

Under aluminum rolling mill scrap there may be included all scrap arising in the production of sheets and shapes by rolling, bars and other sections by extruding, and wire by drawing. This type of scrap need not be considered in detail here, however, since it is normally all returned to the melting furnace in the plant where produced, and little or none of it is available for smelting by the secondary interests. Referring here only to the kinds of scrap produced in aluminum sheet rolling, such scrap is made up of slab and sheet shearings, buckled slabs and sheets which have caught in the mills during rolling, defective sheets (such as those rejected on inspection because of occluded dross, stains, splinters, slivers, and for other reasons), sheet shearings and trimmings, and the like. The diposal of aluminum scrap in sheet rolling practice has been discussed at length by the present writer and M. B. Anderson in another place.[1]

ALUMINUM FABRICATING SCRAP

Aluminum fabricating scrap results from the various mechanical operations on sheet and other semi-finished forms. It is usually light and in small pieces, such as punchings and stampings, and can be readily baled before re-melting. Cooking utensil factories produce large quantities of this type of scrap in the form of shearings, clippings, punchings, and coarse and fine hay from beading and trimming operations. Automobile body factories are also a source of considerable light scrap.

The majority of stamping plants use sheet purchased from outside sources and are not equipped to re-melt. Hence their scrap goes to secondary smelters.

MISCELLANEOUS OLD ALUMINUM SCRAP

Forms of scrap not mentioned specifically above include old aluminum wire, painted aluminum sheet, plain aluminum sheet, discarded and defective utensils and vessels, small stamped and pressed articles, like jar covers, and wire and cable. The last two are very desirable forms of scrap, being of high purity. There is a growing use of aluminum wire of small diameter which is electrolytically insulated with a film of aluminum oxide,[2] and wire of this kind is difficult to re-melt. The painted aluminum sheet comes from the junking of old motor cars and a small, though increasing number of collapsible tubes are appearing as available smelting scrap.

[1] Anderson, R. J., and Anderson, M. B., Aluminum Rolling Mill Practice, Chem. and Met. Eng., Vol. 22, 1920, pp. 489-491; 545-550; 599-604; 647-650; 697-702.

FOUNDRY SCRAP

Foundry scrap consists of gates, runners, risers and defective castings. It is almost always returned to the melting room in the foundry where it is produced. Furnace scrap consists of splashings, drippings, and skimmings, and is also returned to the furnace in the same plant. The rolling, forging and other fabricating of aluminum and aluminum alloys result in the production of a fair amount of scrap, almost all re-used in the plant where made.

MACHINING SCRAP

This consists largely of what is known as borings, but in addition, a fair amount of scrap, produced in foundry cleaning rooms, consisting of chippings, sawings, grindings, and dust is generally sold to smelters. Borings from the machine shop of a motor car company may be regarded as typical of the machining scrap offered to the secondary smelters.

It must be pointed out that the recovery in smelting borings is very largely dependent upon the condition of the borings. In machine-tool operations on aluminum-alloy castings, it is general practice to employ a lubricant, such as a light cutting oil (kerosene) or an emulsion of oil in a soap-water solution. If the borings from machining operations are permitted to stand in the air when wetted with such solutions, they become superficially oxidized and caked together. Moreover, since the borings become covered with whatever lubricant is used in machining, when they are swept along the floor, dust and dirt particles are caught up by, and adhere to, the lubricant and thus become mixed with the borings. If iron, steel, brass or bearing metals are machined in the same room as aluminum alloys, there is grave danger that chips from the former materials will become mixed with the aluminum-alloy borings. In fact, it is the exception to find aluminum-alloy borings, as received from machine shops, not contaminated with dirt and chips of other metals and alloys. There are great differences in the quality of aluminum-alloy borings as offered for sale in the open market, and the secondary smelter can save himself much trouble if he knows the quality of the borings before purchase. Borings should always be purchased on sample representative of the lot offered. Clean, large borings can be re-melted with fairly small losses, but small, dirty, and oil-soaked borings give low recoveries.

It should be emphasized that the chemical composition of aluminum-alloy borings is very variable, as is the case with drosses, since many different aluminum-alloys are being cast now in foundry practice. Of course, as is well known, the bulk of these castings made in the United States today are poured in two alloys; viz., 92:8 aluminum-copper alloy (i.e., standard No. 12 alloy) and 90:7:1:2 aluminum-copper-iron-zinc alloy. About 50 per cent of the production is made in the former alloy, 40 per cent in the latter, and the remainder in other alloys. Increasing amounts of silicon-bearing aluminum alloys are being used, and the disposal of borings is causing more trouble than formerly because of the variety of alloys being cast.

HEAVY ALUMINUM-ALLOY SCRAP

Considerable heavy aluminum alloy scrap finds its way to the secondary smelters through the junking of old motor cars, and the amount arising from this source is increasing rapidly since more castings are being used than formerly for automotive parts and more cars are

[2] Skinner, C. E., and Chubb, L. W. the Electrolytic Insulation of Aluminum Wire, Trans. Am. Electrochem. Soc., Vol. 26, 1914, pp. 137-147.

being built. Heavy aluminum-alloy scrap of this kind is good material for re-melting since the composition is moderately uniform. Under particular conditions, large amounts of heavy scrap may flood the market. Thus, in 1919, the market was overloaded with great quantities of aeroplane scrap, consisting of scrapped crankcases, oil pans, pistons, manifolds, and other parts from aviation engines which were discarded at the end of the war. Automotive castings scrap is sought by aluminum-alloy founders in competition with the secondary smelters, since such scrap is almot equivalent to new metal as to properties, and for some parts can be melted and cast directly. Moreover, the cost of making up an alloy is saved by using scrap of this type. Heavy aluminum-alloy scrap is obtainable from concerns which wreck old motor cars.

COMPARISON AND SMELTING VALUE OF THE SCRAPS

Drosses are normally crushed and screened in order to remove as much of the aluminum oxide as possible, while borings are usually smelted directly after passing over a magnetic separator to remove admixed iron and steel chips. Thus, the cost of smelting drosses is ordinarily higher than for smelting borings on the basis of unit weight of charge treated, and, moreover, the recovery of metal in dross smelting is considerably lower than in running borings. Drosses are less in demand than borings and related scraps, and the price is always much lower. New aluminum sheet clippings are desirable for secondary smelting, and such scrap forms the basis for the production of secondary aluminum pig, i.e., 98-99 per cent aluminum. The recovery from clippings is ordinarily high, and the resultant pig should be of good quality if the furnace treatment is correct. Aluminum sheet clippings and related scraps are useful in smelting miscellaneous alloy wastes to casting pig, since the aluminum scrap is employed for diluting impurities in the alloy wastes, thus permitting the production of an alloy casting pig of suitable composition. Heavy aluminum-alloy scrap, like automotive junk, can be melted with small oxidation loss and run directly into pig without any alloying, and a casting pig of good quality may be so produced. The cost of such scrap is, of course, rather high owing to its condition and because of competition for it by the alloy foundries. Fine, light scraps yield lower smelting recoveries than do large heavy scraps, and dirty oil-soaked scraps give lower returns than clean, new scraps.

In the average secondary smelter, it is customary to purchase practically any kind of aluminum-bearing waste, provided the price is low enough, and hence the problem of the smelter is to produce merchantable pig from a miscellaneous assortment of scraps. It will be seen, then, that one of the most important items in the management of a secondary plant is the exercise of careful buying, and too much emphasis cannot be laid on the necessity for not only knowing what is purchased, but also obtaining the scraps at a sufficiently low price to permit operating at a profit. Another of the most important items in secondary practice is skillful metallurgical operation in blending scraps, together with their proper furnacing, so as to produce merchantable pig from the various scraps purchased. The difficulties of blending are being increased with the increasing number of alloys being used in the casting industry, and the time has passed when the secondary smelter can expect to operate at a profit without skilled metallurgical supervision.

MARKETS

Aluminum drosses are not ordinarily quoted in the metal markets since their compositions vary so widely. Borings, clippings and castings are quoted.

The relative prices for some scraps may be taken as follows, with primary aluminum pig selling at 28 cents per pound; aluminum alloy borings, 8-9 cents; old aluminum alloy castings 15.5-16 cents; and new aluminum sheet clippings, 19 cents. With these prices, dross containing 50 per cent free metal might have an offering price of 3.5 cents per pound.

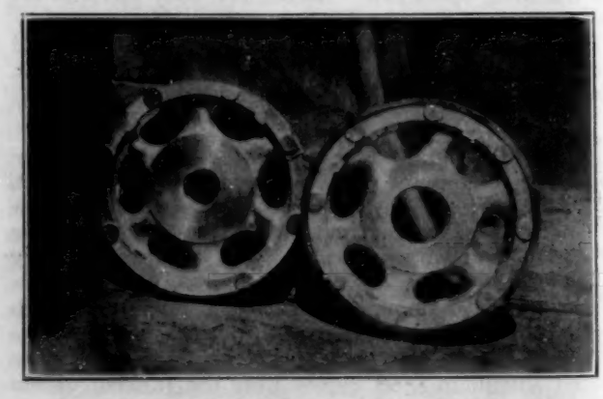
It is often possible to have scrap materials run down by a smelter on toll, and the pigs returned to the sender. The weight returned should be equivalent to the scrap sent out, less a smelting loss.

This series will be continued in an early issue.—Ed.

Replacing Wood with Aluminum

A hollow cast aluminum wheel has been adopted by the California Transit Company after extensive service tests as standard for the company. Because of the extremes in temperature in the territory where the California Transit Company stages are operated (there being a temperature as high as 120 degrees in the interior valleys, and as low as 50 degrees around San Francisco Bay) wooden wheels have not proved satisfactory. This condition combined with the lightness, strength and neatness of the cast aluminum wheel was responsible for the adoption of the cast aluminum wheel which is 20 inches in diameter, and without hub or felloe band weighs 20 lbs. which is on a parity with the weight of the average wooden wheel. The illustration shows two of the aluminum wheels, one with the felloe and one without the felloe band. The felloe band is heated to expand so that it will slip over the aluminum wheel, and shrink on becoming very tight.

A comparative test was made by subjecting the best available wooden wheel and a new aluminum wheel to cross bending load in the hydraulic wheel press. In this test the wheel was laid on its side and the pressure applied by the press at right angles to the plan of the wheel just outside the hub, the thrust being balanced by two parallel supports on the opposite side of the wheel applied near its circumference. The wooden wheel which was tested in this way showed evidence of distress under



CAST ALUMINUM WHEELS FOR MOTOR STAGES

pressure of one ton and gave way entirely under pressure of two tons. When the aluminum wheel was subjected to pressure no evidence of distress had appeared up to twenty tons.—C. W. Geiger.

A New Dip Test for Zinc Coated Ferrous Articles

A New Method Developed in the Laboratories of the Roessler & Hasslacher Chemical Company

Written for The Metal Industry by C. J. WERNLUND, Chemist, Electroplating Department

All accelerated corrosion tests of zinc plated coatings are of necessity more or less empirical since they must measure the resistance to corrosion of thin sheaths of metal which often vary widely in porosity, crystal size and hardness; and to a lesser, though appreciable extent, in purity and electrode potential. The rate of corrosion of porous electrodeposits is further influenced by variations in the catalytic activity, the electrode potential and the purity of the base metal. Since it has been found extremely difficult to get accurate corrosion data of pure rolled sheet metal, the best that can reasonably be expected for electroplated articles is a simple, easily-reproducible empirical test possessing a clearly visible end-point, and which will rapidly remove the zinc at a substantially uniform rate over the entire surface of the test piece. Such a test when properly standardized should enable the operator to measure the approximate minimum thickness of his zinc coatings or the approximate thickness of the most severely exposed portion of the coatings.

In spite of the fact that we already have seven standard empirical methods[1] of testing the thickness of zinc coatings, i.e., the hydrochloric acid-antimony chloride method, the basic lead acetate method, the sulfuric acid permanganate method, the copper sulfate or Preece test, the thermal method, the evolution of hydrogen method and the salt spray test, the zinc plating industry is still badly in need of a simple, rapid, discriminating shop test for satisfactorily gauging the minimum thickness of zinc coatings on steel. This is attested to by the recent articles by Farnsworth and Hocker[2] and by Peirce.[3]

The former have developed a new method for testing the quality of various kinds of zinc deposits, whereas the latter has shown that the results obtained by the copper sulfate or Preece test, the most widely used of all, may readily vary as much as 100 per cent and sometimes as much as 400 per cent on hot galvanized coatings.[4]

Since unavoidable variations in the quality of zinc deposits seemed to exclude the possibility of scientific accuracy, it was decided that another empirical shop test combining the speed and simplicity of the Preece test with the accuracy of the Farnsworth Hocker test should, if possible, be developed. In order to imitate atmospheric corrosion as far as possible, a solution was chosen which combines high concentrations of the chief active factors in atmospheric corrosion, i.e., oxygen ion and hydrogen ion.

The present article is a preliminary report of an acetic acid-hydrogen peroxide dip test which has been developed by us to meet the requirements noted above. It promises to combine speed and simplicity with reasonable accuracy. It is carried out by simply immersing the zinc coated article to be tested in a beaker of the hot test solution (95°C), and noting the time, preferably with a stop watch, required to obtain a bright red rust on the steel. The test assumes uniform removal of the zinc. More exact information covering the degree of parallelism between this test, atmospheric corrosion and other accelerated corrosion tests will be published later.

[1] See A. S. T. M. standards (1924) pp. 326 to p. 331 and Bureau of Standards Bull. No. 80. "Protective Metallic Coatings for the Rust Proofing of Iron and Steel."

[2] Trans. Amer. Electrochem. Soc. 45, pp. (1924).

[3] The Iron Age, Vol. 114, p. 199.

[4] The copper sulfate test has also been condemned because of its irregularities by a Committee of the American Society of Testing Materials. See Proc. Amer. Soc. Test. Mat. 1911, vol. 9, p. 100; and *ibid.*, 1917, Part 1, p. 144.

DIRECTIONS FOR CARRYING OUT THE TEST

1. Equipment:

The following equipment is necessary to carry out the test:

1—Hot Plate
2—or more Pyrex Beakers or Enamelware Pots of a size adapted to the work to be tested
1—1000 cc. Graduate
1—100° C. Thermometer
1—50 cc. Burette
1—Burette Holder
1—Glass container for storing the test solution
Glass stirring rods

2. Procedure:

(A) Methods of Preparing the Test Solution: One (1) liter of the stripping solution is prepared as follows: To 300 cc. of distilled water in a glass beaker or enamelware pot add enough cracked ice to cool the solution to the freezing point. (If cracked ice is not available cold water will suffice). Add 33.3 cc. (35 gr. to the beaker) of glacial Acetic Acid. When the contents of the beaker is ice cold, slowly add 10 gr. of Sodium Peroxide while stirring. When all of the Sodium Peroxide has dissolved, add water to make 1000 cc. of solution. Upon stirring the solution is ready for use.

In case Sodium Peroxide is not available the solution can be prepared as follows:

Hydrogen Peroxide (3%) regular medical product...	140 cc.
Acetic Acid (Glacial).....	20 g. (19.1 cc.)
Distilled water to make....	1 liter

(B) Method of Testing the Zinc Coated Sample: The tests are carried out as follows: 200 cc. of the above solution, or as much more as may be required for a large article, are put into a beaker or enamelware pot and heated to 95° C. (incipient boiling). The zinc coated sample to be tested is now immersed in the solution. The time required to strip the sample in the recesses is carefully noted, preferably by a stop-watch, the conclusion of the test being noted by a rust colored spot. In other words, the operator simply determines the minimum time required to rust the sample in the solution.

Interpretation of the Results: The minimum time required to rust the coating is extrapolated on the attached drawing on the curve corresponding to the kind of coating being tested, i.e., Cyanide Zinc-mercury alloy coating, Cyanide Zinc coating, or sulfate zinc coating. The corresponding weight and thickness of coating are given on the abscissa.

The data from which the above curves were drawn were obtained as follows: The zinc deposits were made upon chemically clean 1" x 3" pieces of soft annealed sheet iron 0.015 in. thick. In plating the samples the cathode was midway between the two anodes, and all were kept as nearly parallel as possible to obtain a uni-

form weight of coating over the entire cathode surface. The solutions used for plating the samples were:

	CYANIDE ZN-HG DEPOSITS	ORDINARY ZINC CY. DEPOSITS	SULFATE DEPOSITS
Zinc cyanide (55%)	37.5 g/L	37.5 g/L	..
Sodium cyanide (96-98%)..	22.5 "	22.5 "	..
Sodium Hydroxide (C. P.)	30.0 "	30.0 "	..
Mercuric cyanide (C. P.)	0.15 "	....	..
Zinc Sulfate (C. P.)	....	....	240 g/L
Magnesium sulfate (C. P.)		....	30 "
Sulfuric acid (C. H.).....	....	....	1 to 2 "

The weights of the coatings were obtained by weighing the dry cathodes before and after plating. The initial and final times of breakdown were noted, and the mean taken as the true time of breakdown of each sample.

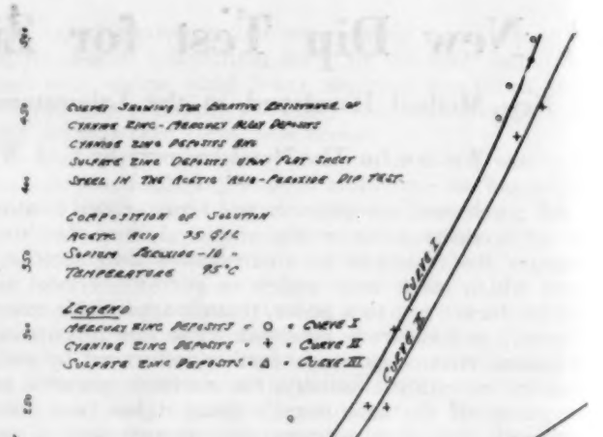
DISCUSSION

While the coatings were made as nearly uniform in thickness as was possible, the tests indicated that there was considerable variation in the thickness of the heavier coatings upon different parts of the sheet in the case of the sulfate solution. As a consequence, the curves are only approximately correct. It is therefore a question whether these curves show simply differences in throwing power or whether they actually show differences in the rate of solution of different kinds of coatings. They have been inserted merely as illustrations of the results thus far obtained, and not as scientifically accurate data.

The chief practical utility of the new test consists in the fact that it promises to give us a simple and rapid method of determining the approximate minimum weight of zinc coating on our work. This is best illustrated by use of the accompanying curves. For example, let us assume that we have broken down a zinc mercury plated article by the new method in 125 seconds. A simple extrapolation upon curve 1 shows us that our work has a minimum weight coating of about 0.245 oz. sq. ft. We have here secured a method which if it stands the test of rigid experiments now in progress, will enable us to quickly and accurately measure the quality of our product at its weakest point.

Other points in favor of the new test are:

(1) The breakdown of the coating is indexed by the appearance of a rust colored spot clearly visible at the instant the breakdown occurs.



CURVES SHOWING RELATIVE RESISTANCES OF MERCURY, CYANIDE AND SULPHATE ZINC DEPOSITS

(2) The test is equally as applicable for testing heavy as light weight zinc coatings.

(3) The present evidence indicates that the new test may prove to be useful in gauging the relative throwing power of the various zinc plating solutions used commercially.

(4) Preliminary tests indicate that the method can also be used for evaluating the minimum thickness of some other electro deposited metals, for example Cadmium.

Increased Plating Output

By T. C. EICHSTAEDT

I was called into consultation by a tool company in the East some time ago on account of nickel plating difficulties. At this time there was quite a lot of so called rapid nickel salts advertising and quite a few different makes of prepared salts on the market supposed to have been imported from Germany and France. This particular concern had purchased enough of one of these prepared mixtures for a tank and were having difficulties with peeling on steel pliers, especially.

Upon investigation it was found that the difficulty was not so much with the nickel solution as it was with cleaning. After the writer had been with this concern a few weeks, the cleaning, etc., had been straightened out and production increased in the nickel solution to more than three times its supposed capacity, even over and above all claims made by the concern selling the nickel salts.

The trouble was simple to one who understood the principles of nickel plating. This particular concern had been going along fairly well with a young man who had picked up his knowledge of nickel plating from one of the many books on that subject, but production had to be increased and then this young fellow ran into difficulties, first on account of the claims made by the concern selling these prepared salts. After the cleaning difficulties had been staightened out and new racks for hanging the pliers designed and made, there were three times as many pliers put into a load and they were plated in one-third of the time of an ordinary nickel solution, consequently, out of the one tank the production was increased just nine times. Just another instance where an experienced man was needed, as this concern had contemplated and planned on putting in new equipment to take care of the necessary increase of production, when in reality they had all the equipment necessary.

What the writer wishes to bring out in citing this case is that many a concern has the equipment necessary to do much more work than they are doing, and before spending a lot of money for extra equipment unnecessarily, they might go into the matter thoroughly and save themselves much trouble, time and money.

Heating and Agitating the Solution

An Improved Method of Supplying Heat and Agitation to the Plating Solution From a Single Source

Written for The Metal Industry by H. E. PELLETIER, Expert Plater

Platers and plating room workers know the difficulties encountered in trying to keep plating baths at a given temperature, especially if steam is used as a heating medium, for both the work-room and the baths. It is a well known fact, that plating solutions, below a certain temperature, work more slowly and more irregularly, and that provision for the proper heating of the plating rooms, as well as for the baths, must be made.

Except in certain processes, such as hot gilding, platinizing, etc., the average working temperature of the solution used in the different processes, is from 65° to 115° F. and should never be below 58° or 59° F., while being in use. In large plants where steam is readily obtained, steam coils are placed in the baths and in the plating room, and the necessary degree of temperature is obtained.

However, it is almost impossible to keep a fixed and constant degree of temperature with most of the present heating equipment, unless special thermostats are installed on each bath. Even then, steam is not always available all the year around and this necessitates the special installation of steam generating apparatus, which is not always feasible.

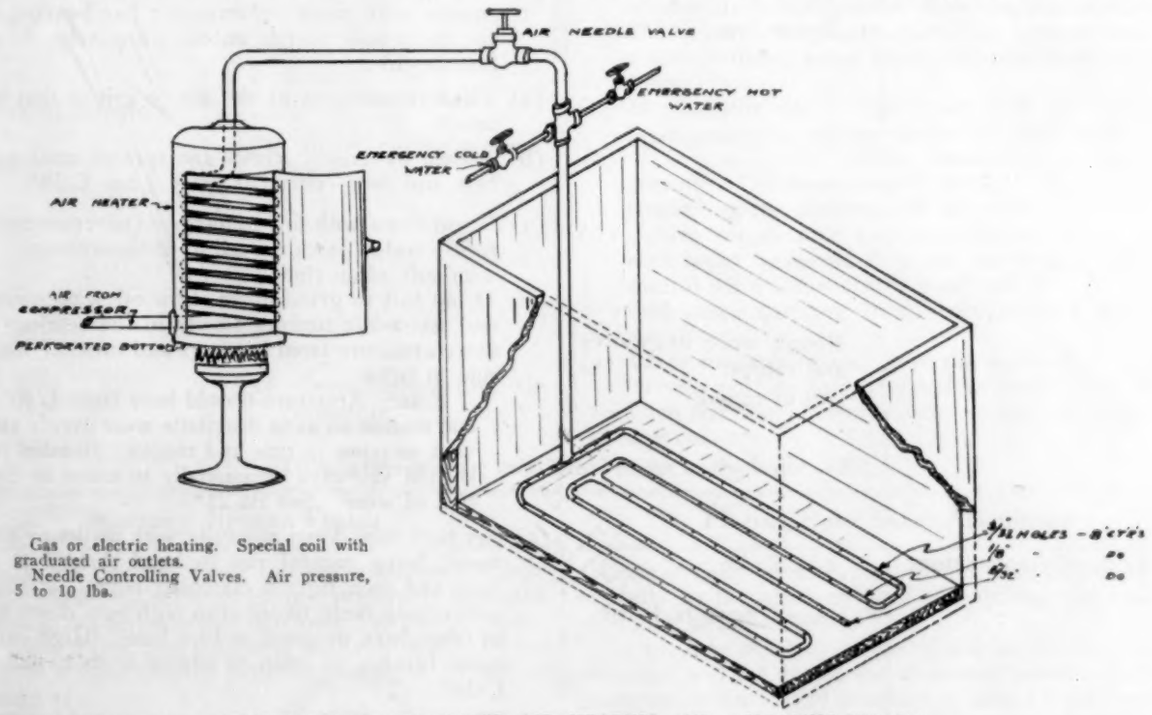
In certain cases where agitation, either mechanical or with compressed air, is used, it is often found desirable to stop and start the agitation. When this occurs, the exact working temperature of the solution is disturbed, sometimes, to a considerable degree, with consequent poor results. And again, when the hot summer months come, it is a hardship for anyone to have to work where a hot steam boiler or hot steam pipes are located; the heat coming from the baths being sufficient, without adding thereto.

Taking all the above into consideration, the writer, when requested to remodel and bring up-to-date a large plating plant abroad, conducted a series of experiments, having in view, the perfect warming of the solution combined with the agitation of the bath. These experiments proved very successful, with the result that all the baths, (ten of them), ranging in size from 6′ x 3′ x 3′ up to 15′ x 10′ x 6′, were equipped with the combination compressed air heating and agitating device (as per illustration), and have been in use ever since.

Up to the time the writer put in operation this combined agitating and heating arrangement, it had always been a mystery to him, why platers, almost in every case, would first install in their baths, air agitating coils and afterwards install steam heating coils, or vice-versa; an extra expense, besides taking away valuable space from their baths. At half the cost and in one operation, the heating and agitating coil illustrated, will and does answer both purposes.

The illustration shows the arrangement of the combination coil in the bath, this coil being made of a metal resistant to the plating solution, suspended in the bath. The controlling valves are so arranged that should it be desired at any time to introduce in the solution either hot or cold water, by closing the hot air valve, either one can be brought in.

Although fixed rules to fit all cases cannot be given, due to the fact that certain modifications are necessary according to the extent and equipment of the electroplating plant, the different methods, etc., nevertheless, the main features of the combination heating device described herewith, are applicable to the majority of plating establishments, without radical changes, at low cost, and is of the most simple operation.



Gas or electric heating. Special coil with graduated air outlets.
Needle Controlling Valves. Air pressure, 5 to 10 lbs.

COMBINATION COMPRESSED AIR HEATING AND AGITATING SYSTEM.

Diseases and Cures of Dynamos and Motors

A Chart Showing Various Difficulties Encountered and Methods of Overcoming Them

Part A. Sparking at the Brushes

Written for The Metal Industry by WM. VOSS

SYMPTOM	CAUSE	CURE
Aa. Fault of brushes	1. Not set diametrically opposite.	(a) Should have been properly set at first while at rest by counting bars, measurement, or by use of reference marks on commutator. (b) Can be done if necessary in emergency while running by bringing brushes on one side to least sparking point by moving rocker arm, and then adjusting brushes on other side to least sparking point by moving in or out of brush-holder and clamping in new position.
	2. Not set at neutral point.	(a) Move rocker arm slowly back and forth until sparking stops. See F-58-f-ff.*
	3. Not properly trimmed.	(a) Brushes should always be kept properly trimmed and set. If sparking begins from this cause and dynamo cannot be shut down, bend back and cut off loose or ragged wires. Retrim as soon as possible after run is over. If there are two or more brushes in each, they may be changed one at a time for new and properly trimmed brushes during the run on any low voltage machine.—See C-38*. (b) To retrim, clean from oil and dirt with benzine, soda or potash, then file or grind to standard jig and reset carefully as at Aa-1 and Aa-4. See C-38*.
	4. Not in line.	(a) Adjust each brush until bearing is on line, and square with same commutator bar bearing evenly for its whole width unless purposely staggered. See Ad-13-a.
	5. Not in good contact.	(a) Clean commutator of oil, dirt or grit so that brushes touch. (b) Adjust by tension screws and springs until light, yet firm and even contact is made. See C-38*.
Ab. Fault of commutator	6. Rough, worn in grooves and ridges. 7. Out of round.	(a) Grind down with fine sandpaper (never emery in any form) laid in stock curved to fit commutator. Polish with soft, clean cloth. (b) If too bad to grind down, turn off with special tool and rest while turning slowly in the bearings or remove armature from bearings and turn off with light cuts in lathe. Note: Armature should have from 1/16" to ⅛" end motion so as to distribute wear evenly and prevent wearing in ruts and ridges. Brushes may be shifted sideways occasionally to assist in distribution of wear. See Ba-21*.
	8. One of more high bars.	(a) Set high bars down carefully with mallet or block of wood, being careful not to bend, bruise or injure bars, and then tighten clamping rings. If this does not remedy fault, file or trim high bars down to level of other bars, or grind or turn level. High bars may cause brushes to jump or vibrate so as to sing. See C-38*.
	9. One or more low bars.	(a) Grind rest of commutator down true and level to true surface so as to clean up the flats.
Ac. Fault of field	10. Weak magnetic field.	(a) Broken circuit in field. Repair if external. (b) Short circuit of coils. Rewind if internal. (c) Dynamo not properly wound or without proper amount of iron. No remedy but to re-build.

*To be published in one of the later installments of this article.

Ad. Excessive Current in Armature Due to Overload.	11. Dynamo.	(a)	Two many lamps on the circuit (incandescent system), or too great a load.	(aa) Reduce number of lamps or loads and thus diminish current called for.
		(b)	Ground and leak from short circuit on line.	(bb) Test out, locate and repair.
		(c)	Dead short circuit on line.	(cc) Note: Dead short circuit will or should blow safety fuse. Shut down dynamo, locate and repair fault. Put in new fuse before starting again. Fuse should not be inserted until fault is corrected as it will blow again on starting up.
	11. Motor.	(d)	Excessive voltage on constant potential circuit.	(dd) Use proper current for motor and no other.
		(e)	Excessive amperage on constant current circuit.	(ee) Proper rheostat or controlling switch.
		(f)	Friction. See Bc and C 35 & 36*.	(ff) Reduce load to proper amount for rating of motor.
		(g)	Too great load on pulley.	(gg) Remedy any cause of trouble from undue friction. See Bc and C 35 and 36*.

Ae. Fault of armature	12. Short circuit in armature.	(a)	Look for copper dust, solder or other cause for metallic contact between commutator bars and remove.
		(b)	See that clamping rings are perfectly insulated from commutator bars and from carbonized oil or copper dust or dirt to make short circuit.
		(c)	Test for internal short circuit or cross connection. If found, rewind armature to correct.
		(d)	Examine insulation or brush-holders for fault. Dirt, oil and copper dust may make short circuit from brush-holder to rocker arm, and thus short circuit the machine. See Ea and Eb and F 60*.
	13. Broken circuit in armature.	(a)	Bridge the break temporarily by staggering the brushes until run is over, then test out and repair. This is only a temporary make-shift to try to stop bad sparking during a run when generator cannot be shut down.
		(b)	If generator can be shut down, look for broken or loose connection to commutator bar, and repair.
		(c)	If coil is broken inside, rewinding is only sure remedy. The break may be bridged temporarily by connecting the disconnected bar to the next bar.
		(d)	Solder commutator lugs together or bring across with heavy wire and thus cut out broken coil. Be careful not to short-circuit good coil in so doing, and thus cause sparking from short-circuited coil as in Ae-12.
	14. Cross connection in armature.	(a)	Cross connections may have the same effect as short circuit, and are to be treated as such. See Ae-12. Each coil should complete circuit with no cross onto any coil.

This series will be continued in an early issue.—Ed.

Statuary Bronze Finish

There is no positive direct dip for a statuary bronze finish upon brass but a film of copper, preferably deposited from an acid copper solution containing 1½ lbs. of copper sulphate and 3 ozs. free sulphuric acid can readily be finished after a light scratch brushing—**wet**, in a solution consisting of:

Water .....1 gallon Temp. 80° F.
Hydrosulphuret of Ammonium.1 oz.

When the Japanese bronze tone is produced the articles are washed in cold and hot waters, hot air or sawdust dried, and then finished by scratch brushing with very soft brass wire scratch brushes—the crimped variety gives the best results. The usual lacquering follows.—C. H. Proctor.

Plating Pure Sheet Aluminum

Commercially pure sheet aluminum can be plated successfully by the usual methods of polishing and cleaning with mild alkaline cleaners.

To produce passivity of the aluminum surface so that oxidation will not ensue, the aluminum articles should be immersed in nitric acid to which is added 2 ozs. perchloride of iron, previously dissolved in a little hot water.

The nitric acid and iron solution must always be in thorough agitation before immersing the aluminum articles, which should remain in the mixture for a few seconds, then washed quickly in clean, cold water and plated in any good, practical nickel solution. However, a solution that contains nickel chloride up to 3 ozs. per gallon should give the best results.—C. H. Proctor.

Electro-Plating Costs

A Description of a Practical and Workable Method of Arriving at the Cost of Plating Operations

Written for The Metal Industry by JOSEPH HAAS, Jr.

To the electro-plater, the subject of costs has not the same general interest, as other subjects relating to the industry would have. But, the question of what it costs, or will cost, to electro-plate a unit quantity of some class of goods, is a question of vital importance to all manufacturers. The effect of costs on profit or loss is very direct and a distorted or inaccurate relation between costs and selling price produces very serious results.

Manufacturers realize that cost information is undeniably the only true basis upon which prices can be based, and that arbitrarily quoting a price, irrespective of knowledge of at least a normal cost produces bad results, not only for the manufacturer, but for the industry as a whole. Adequate costs, apart from their value for price determination, are an index of manufacturing efficiency. With properly prepared costs, the relative efficiency of the various departments can be compared and observed. The results are also valuable as a check upon present performances of the department compared with past performances.

While most manufacturers realize the importance of accurate and dependable technical information in the management of their plant; the importance of automatic machinery, inspection of raw materials, of the advantages of paying labor on the basis of piece rates, of the technical supervision and control of the heat treatment of metals, they are rather slow to admit the advantages to be derived from modern office methods in controlling manufacturing results. No matter how modern or improved may be the manufacturing end of any business, its successful conduct is not assured unless the costs of the products through the various operations are known and controlled.

While much progress may have been made in the methods of gathering manufacturing costs of the various operations in any particular plant, analysis and close scrutiny will reveal that the plating costs have been gathered in a rather indifferent manner. Manufacturers have admitted to the writer that they are at a loss to realize the slightest approximation of accuracy in the matter of plating costs, that they are capable of in other departments. The reason for this inability of manufacturers to obtain dependable plating costs is that there exists in their minds, the opinion that electro-plating is so different from other manufacturing operations, that no system which could be operated in a practical manner would give them dependable results. And the plater thinks so too. How is a plater to determine how much caustic, or other cleaner is used up in a tank to remove grease from a unit quantity of product? How much polysulphide is to be charged to a particular oxidized job, or how much cyanide or acid in the various pickling operations? Even if this could be determined, it would involve a great deal of chemical work in addition to a great deal of clerical work. When all this has been done, the results might not be any more accurate than some simpler method. While it is true that some branches of electro-plating permit more readily the accumulation of cost data than others, it is also true that no branch is so complex, but that a workable system can be devised and operated in a thoroughly practical manner which will give reasonably accurate results.

This article was written to outline a method of gathering electro-plating cost data, and incidentally polishing and buffing costs. The most common objections to gathering cost data in the plating room are those of expense, and that the plater already has enough to do without gathering such data. Many are of the opinion that a cost system means a larger amount of detail, red tape, and the employment of considerable additional help. Whether any additional help will be required besides the foreman, will depend upon the number of men employed. A large plating department may require the services of one clerk. It should not be asked that the plating department calculate costs, but merely accumulate them. The calculation of the costs and the allotment of the various charges should be the duty of a special cost department or of the cost accountant.

There are many manufacturing firms that have absolutely no data gathered on costs pertaining to electro-plating. The following has been within the experience of most platers, illustrative of the lax method of gathering costs on plating. The factory superintendent or the cost accountant comes to the plating department with a piece of work, and asks the labor, chemical, and metal deposit cost per unit quantity. Ninety-nine out of a hundred platers, after a little reflection, would give a figure, which would be accepted. What great faith in a man's ability and judgment, but what poor business!

The first requisite in cost gathering is the determination of just what data are requisite and desirable to accumulate, and then after making a survey of the various operations performed in the department, and by the department for other departments, the decision can be reached as to how the various data are to be gathered.

LABOR ELEMENTS

The labor cost involved in plating a unit quantity of goods will undoubtedly be the first concern in gathering costs. Therefore at this stage it becomes necessary to separate the various electro-plating labor operations and then group them in a practical manner. Without question, wherever piece rates can be given labor operations, such should be done. The labor operations of plating, depending upon the nature of the work being done may be listed as follows:

1. Racking or wiring.
2. Cleaning.
3. Plating.
4. Oxidizing.
5. Unracking.
6. Scratch brushing.
7. Relieving.

These operations might each be performed separately, each with its own day rate or piece rate, or might be grouped according to the nature of the work and its flow through the department. The essential point is that it be definitely known what labor operations are performed and that they be properly grouped. This can best be accomplished by having a schedule for cost information drawn up, listing the operations performed in sequence. Then the timing of these direct labor operations resulting in giving the direct labor costs, becomes a simple matter.

By many manufacturers the direct labor cost thus obtained is taken as the plating cost. Others again ask an estimate of chemical cost in addition. In some plants the work may be of such a nature, that the chemicals used may be directly charged, while in other cases, the cost of chemicals would have to be charged to the cost of the product in a different manner. To this point, it will be agreed, that any assumed costs would be far from reflecting the true cost of any plated product.

OVERHEAD FACTOR

In the operation of any department there are many expenses involved that cannot be charged directly to any particular product, but must be distributed fairly over the total volume that passes through the department. Therefore the most practical method of gathering cost data is the establishment Departmental Overhead Factor which is added to the actual labor cost. This factor would include:

1. Indirect labor, or labor that cannot be attached to the plating operations as outlined; salaries of foreman, clerk and other supervisors.
2. Repair and maintenance of department equipment.
3. Cost of chemicals and anodes consumed (Gold and silver are directly charged).
4. Cost of power, steam and light.
5. Rent on floor space of department; interest on investment in plating department.
6. Depreciation of plant and department equipment such as tanks, generators, meters, steam and water lines, etc.

Thus far we have outlined the fundamental principles regarding costs which state that all expenses that can be directly charged or attached to a manufactured product be so charged. All other expenses are accumulated, and then charged to the cost of manufacturing according to a definite plan. In this case we have adopted the "percentage on wages" method. Having decided upon the necessary data to be gathered for costs, let us now analyze in detail the working out of our methods.

ITEM

Quantity to be completed | Number of operation

Name of operation

Requisition Number

REMARKS

Week Ending
Card No.
Employee's No. | Card
Job No.
Quantity Finished
Rate per Hundred
Total

Week Ending
Card No.
Employee's No. | Card
Job No.
Quantity Finished
Rate per Hundred
Total
Foreman's Signature

Quantity finished	P	D	Start	Finish	Elapsed Time

FIG. 1. TIME CARD FOR SPECIALIZED OPERATIONS

DAILY PLATING REPORT DATE

Article	Operators	Start	Finish	Elapsed Time	Rate	Wages	Plate	Gross	Doz.	Pcs.	In	Out	Vat No.
d e f	Brown	7:00	9:18					1	4	0	7:36	7:39	18
"	Fisher							1	4	0	7:40	7:43	12
"	Smith							1	4	0	7:46	7:49	18
"	Marshall							1	4	0	7:51	7:54	12
"	Davis							1	4	0	7:56	7:59	18
"	Miller							1	4	0	8:02	8:05	12
"								1	4	0	8:10	8:13	18
"								1	4	0	8:15	8:18	12
"								1	4	0	8:20	8:23	18
"								1	4	0	8:26	8:29	12
"								1	4	0	8:30	8:33	18
"								1	4	0	8:35	8:38	18
"								1	4	0	8:45	8:48	12
"								1	4	0	8:49	8:52	18
"								1	4	0	8:53	8:56	12
"								1	4	0	9:02	9:05	18
"								1	4	0	9:07	9:10	12
"								1	4	0	9:14	9:17	18
"								1	4	0	9:19	9:22	12
								1	4	0	9:23	9:26	18
a b c		9:18						2	2	8	9:28	9:30	12

FIG. 2. FORM FOR DIRECT COST OF ARTICLES PLATED BY THE GROUP METHOD

DIRECT LABOR COSTS

The manner in which direct labor costs would be obtained, would depend primarily upon the nature of the work and its flow through the department. In those plating departments where the work is handled individually, that is, one operator racks, another cleans and plates, a third produces the brush brass finish, etc., a card such as illustrated in Fig. 1 is best suited. The card punched in a time clock furnishes a complete record of the time spent in direct labor on a particular product. This reduced to money, furnishes the direct labor cost. In other plating departments, it might be economical to have the operators work in groups, that is, the group as a whole racks or wires, and each individual of the group takes his turn at plating. This form of labor is advisable where large quantities of the same product are handled for several hours and then the group as a whole swings over to another item. The direct cost of a product plated by the group method may be obtained by means of a form illustrated in Fig. 2, which is filled in by the group. Fig. 2a shows the sheet completed by the department time clerk and ready to send in to the cost department. The costs as determined by either Fig. 1 or 2 are then posted on cost sheets in the cost department. Attention is called to the fact that Fig. 2 is not primarily a cost sheet, but is also a record of production, and is used as such by the production department.

This article will be concluded in an early issue.—Ed.

DAILY PLATING REPORT DATE

Article	Operators	Start	Finish	Elapsed Time	Rate	Wages	Plate	Gross	Doz.	Pcs.	In	Out	Vat No.
d e f	Brown	7:00	9:18	2:18	.40	.93		1	4	0	7:36	7:39	18
"	Fisher				.40	.93		1	4	0	7:40	7:43	12
"	Smith				.25	.58		1	4	0	7:46	7:49	18
"	Marshall				.30	.70		1	4	0	7:51	7:54	12
"	Davis				.25	.58		1	4	0	7:56	7:59	18
"	Miller				.30	.70		1	4	0	8:02	8:05	12
"								1	4	0	8:10	8:13	18
"								1	4	0	8:15	8:18	12
"								1	4	0	8:20	8:23	18
"								1	4	0	8:26	8:29	12
"								1	4	0	8:30	8:33	18
"								1	4	0	8:35	8:38	18
"								1	4	0	8:45	8:48	12
"								1	4	0	8:49	8:52	18
"								1	4	0	8:53	8:56	12
"								1	4	0	9:02	9:05	18
"								1	4	0	9:07	9:10	12
"								1	4	0	9:14	9:17	18
"								1	4	0	9:19	9:22	12
"								1	4	0	9:23	9:26	18
						4.42		26	8	0	Cost per	gross	.1657
a b c		9:18						2	2	8	9:28	9:30	12

FIG. 2A. FORM AS SHOWN IN FIG. 2, FILLED IN BY DEPARTMENT TIME CLERK.

A Short Cut in Nickel Plating

By T. C. EICHSTAEDT

The writer once took a position with a company doing mostly nickel plating. All steel work was plated with copper first and buffed, and all brass, also other metals, were just struck upon copper as a safeguard against peeling. This was the practice of this concern. No doubt it was the method used by one of the platers employed and came to be considered necessary practice. The writer, after careful observation and study, finally concluded that he could do away with this practice and even the copper buffing on the steel work. Also by making his nickel solutions of higher density and metal content, cut down the time of deposit and consequently increase the production without any detriment to the deposit either as to protection or ornamentality.

This concern had quite a few platers employed before the writer took the position and all of them had claimed that there was not room enough or equipment enough to get out the required production. If necessary, however, a night force could be employed in order to get out on the schedule. This, the writer did not think much of. Consequently, he got busy with the result that by cutting out the copper buffing on steel work, making the cleaner a combination copper cleaner to take care of this, and by building up the nickel solution to a high speed deposit, we turned out the required production and then discarded a 300-gallon nickel tank entirely and needed no night gang. In fact the production was increased much more during the year and still the plating department only needed to work five days per week while the rest of the factory ran five and a half days, the total saving in plating department being more than 60 per cent over previous costs.

Spotted Reflectors

Q.—We are experiencing some difficulty in the process of silver plating the reflectors in our lamps and we are of the opinion that you might in some way help us out. Our reflectors are first nickel striked, then silver striked and afterwards silver plated, and still after they have been in the lamp a few days there are white flaky spots which show and we are at a loss as to the cause. For your information would say that the base metal is brass.

A.—Your methods of silver plating auto lamp reflectors are correct in each instance. The flaky spots that result in a few days upon the silver plated surface are the result of the well known "spotting out."

To eliminate: wash the reflectors more carefully, at least 3 immersions each, in cold and boiling water. To the boiling water, add a small amount of slacked lime, ¼ oz. per gallon of hot water will be ample. After completing the washing operations, dry the reflectors out at a temperature of 212° F. for 15 minutes. You should have no further spotting out if these methods are adhered to.—C. H. PROCTOR.

The Electro-Plating Industry in 1924

A Review of Technical and Economic Developments During the Past Year

Written for The Metal Industry by CHARLES H. PROCTOR, Plating-Chemical Editor

From a survey of business conditions as I find them as late as the end of November, 1924, in many lines of industry, my conclusions are that we are now in the midst of a great business revival, and in the year 1925 and several succeeding years, its volume should increase so that the old familiar "seven years of good business" adage should come true.

The law of supply and demand, however, is the great and only factor that determines business conditions. The American workman is the greatest consumer in the world, and if we can keep him employed on a hundred per cent basis, his demand will always create the necessity of supply from the results of his labor.

CHARLES H. PROCTOR

INSTITUTE OF ELECTRO-PLATING

The splendid work so far accomplished by the Bureau of Standards in its co-operation with the American Electro-Platers' Society in the Joint Committee meetings at Washington, D. C., is most beneficial to the industry at large. I am still a firm believer, however, that every great commercial society should be in a position to do its own work, especially research work. I have frequently stated that theory is of value only when it can be worked out on a practical, commercial working basis. The theory is of no value, like money, unless it can be put to work to produce results. The American Electro-Platers' Society must control its own destiny if it is to be the great factor that it was intended to be. We must have an Institute of Electro-Plating governed by men who are pre-eminent in the industry and understand what are and should be its aims from the standpoint of commercial practice and production. I should be more than pleased to hear from all those who are interested in the advancement of electroplating; a candid statement as to their opinion of the value of an Institute of Electro-Plating, giving due consideration as to its future possibility, and the work it could accomplish. A few minutes time and a two cent stamp will register your vote and THE METAL INDUSTRY will be pleased to acknowledge receipt through its pages.

METALS USED FOR PLATING

There has not been very much change in the list of finishes mentioned in the 1923 review of the electro-plating industry. In the automobile industry nickel is still the great factor for finished metal products. The coming year, however, should see many of the recognized commercial finishes utilized in interior car finishing. Antique silver, bright yellow and antique green gold finishes harmonize splendidly with the various fabrics used as interior coverings. Antique bronze finishes would also be very effective.

Chromium is still the missing link in the plating industry. Its progress through 1924 has been very slow. It has not yet reached the stage where it can be considered a commercial electro-deposited metal. Its non-tarnishing qualities and extreme hardness will give it a great value to industry when it reaches the commercial stage. So far as the metal's value as a protective coating against atmospheric influences, it is yet to be fully determined under the usual corrosive tests applied to cadmium and zinc. Its protective value for the ferrous metals is of but little value when compared with the commercial metals cadmium and zinc.

Cadmium has been used on a commercial basis in many American plants, especially for small metal parts, screws, nuts, bolts, etc. However, its comparatively high cost, when compared with the low cost of zinc, is still detrimental to its greater field of usefulness. Zinc is being used more extensively as a rust resisting factor on iron and steel used in automobile construction with each succeeding year. The mercury zinc alloy deposit is an important one. It almost equals cadmium in its protective value at one fifth of the cost.

ZINC TESTS

Many of the very large firms manufacturing zinc plated automobile products have adopted standard specifications for thickness of deposits ensuring rust resisting and wearing qualities to their products. The recent development of two new tests for zinc coatings the Hocker-Farnsworth[1] and the Wernlund[2] tests will prove of great value in the determination of the quality of zinc plated deposits and their resistance to atmospheric corrosion. The Preece test which only determines the thickness of the zinc deposit and not its quality, is obsolete in view of the more effective tests mentioned. It should be eliminated by the Underwriters' Laboratory and by the electro plating industry.

BUILDERS' HARDWARE

Builders' hardware is still finished in endless variety. There is still much room for improvement, however, in plated steel, which will result in much more rust-resisting deposits of copper, bronze, brass, and nickel. It is possible under advanced nickel plating methods with solutions of high metal content and high current densities to produce a nickel deposit on iron or steel that will approximate zinc in its rust-resisting values. Alternating deposits of copper, nickel, copper, and nickel, or nickel, copper and nickel, give very highly in such rust resisting nickel coatings.

SILVER PLATE

In the silver plate industry, very few changes have been noted in finishes. The Butler or platinum gray and old Dutch silver finishes still predominate. This statement also applies to Sterling silver products. The world still anxiously awaits a non-tarnishable Sterling silver that will approximate the standard of 925 fine. In the writer's opinion the standard will have to be revised to a lower basis before a non-tarnishable silver will result. The price

[1] See THE METAL INDUSTRY, May, 1924, p. 182.
[2] See THE METAL INDUSTRY, this issue, p. 13.

of fine silver, in the writer's opinion, will go upwards during 1925, although when this review was written, the price of silver was on the decline.

JEWELRY

In the jewelry trade, platinum articles are still in great demand. Its intrinsic value alone is the factor that creates the demand for the metal. In the early eighties, when platinum was selling around twelve dollars per troy ounce, it was not used for personal adornment. Its resemblance to nickel gave it a non-precious metal comparison. It was considered too cold and unattractive for personal adornment of people of wealth. White golds have reached such a state of perfection, that it is difficult to tell platinum from white gold. The greater density of the former metal, however, tells the experienced eye the difference in the two metals. The demand for white gold articles for personal adornment is constantly on the increase. The green gold finishes are still in great demand and yellow gold which includes Roman and English, are gradually coming into demand.

LIGHTING FIXTURES AND NOVELTIES

In the lighting fixture industry as well as in the art metal industry, the products are still finished in endless variety. Polychrome finishes and antique finishes are still the factors. Silver is used to a great extent. The finishes that predominate are the platinum gray, Butler and antique silver. The women of our country keep the novelty trades close to a normal production basis because there is always something new and attractive being brought out by the manufacture of novelties.

LACQUERS

The lacquer industry is in a very healthy condition. Metal products are finished in endless variety of colors and shades by the aid of pigment and bronze lacquers. Enamel finishes with nitro-cellulose base are being used extensively in the automobile and furniture industries, replacing gum varnishes to a great extent. The transparent lacquer industry has problems that require attention. It was at one time considered that all spotting out of finished metal products was due to chemical action of minute amounts of the electro-plating solutions remaining in the pores of the plated metals, but spotting out in the plating industry has not been eliminated. The compositions of lacquers seem to need revision. A great deal of spotting now happens on lacquered metal products that have not been plated or finished. What is the reason?

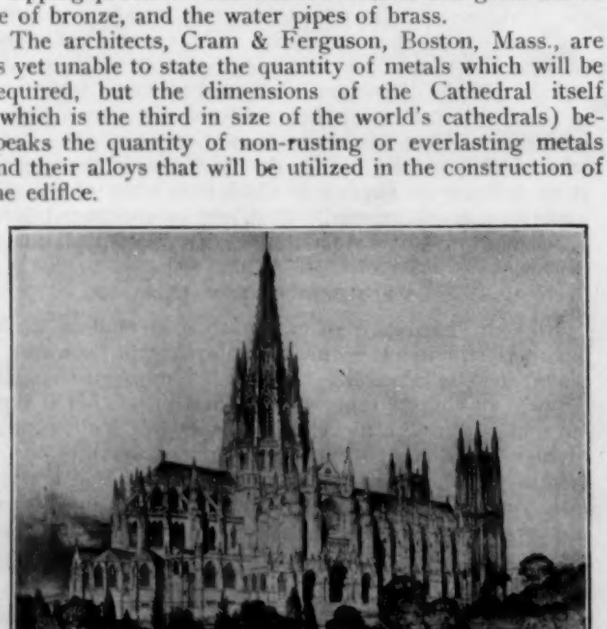
WORK FOR 1925

There is work for all branches of the electro-plating and metal finishing industries to do in 1925, if we want to go forward and reach a higher plane and a greater knowledge of its problems and their solutions. They can be solved with a long pull, and a strong pull, and a pull all together. Let us all take hold of the rope.

Everlasting Metals in a New Cathedral

In the new Cathedral of St. John the Divine, now building in New York City, it is the intention to use the non-rusting or the everlasting metals, exclusively. The main roof, gutters, conductors and flashings are to be of copper. Wherever exposed, they will be lead coated by a dipping process. The window frames and grills are to be of bronze, and the water pipes of brass.

The architects, Cram & Ferguson, Boston, Mass., are as yet unable to state the quantity of metals which will be required, but the dimensions of the Cathedral itself (which is the third in size of the world's cathedrals) bespeaks the quantity of non-rusting or everlasting metals and their alloys that will be utilized in the construction of the edifice.



CATHEDRAL OF ST. JOHN THE DIVINE, NEW YORK, AS IT WILL APPEAR WHEN FINISHED

Its area when entirely finished will be 109,082 square feet; the extreme exterior length 601 feet; extreme height of the central tower 500 feet.

Super-Conducting Copper

The production of copper that is capable of transmitting 13 per cent more current than present conductors was announced December 31, 1924, by Dr. W. P. Davey of the Research Laboratory of the General Electric Company at a meeting of the American Association for the Advancement of Science. These results were obtained with the large single-crystals of copper, the experimental production of which was recently accomplished in the Schenectady laboratory. Use of single-crystal copper is at present not commercially possible because of the delicacy of the crystals and because of the difficulties of manufacture, but from a scientific standpoint the results of these investigations are far-reaching.

The single copper crystals were made by very gradually heating and cooling pure copper in an electric furnace. When molten metal is quickly cooled, very small crystals are formed; if the melt is cooled slowly, the crystals are larger. Employing the method of P. W. Bridgeman, Dr. Davey cooled the melt so slowly that only one crystal was formed, and that included all of the metal. By this method he mas able to produce single crystals seven-eighths of an inch in diameter and six inches long.

In a crystal, the atoms—the unit particles of the substance are built up in regular fashion. The crystals of atoms of copper at the corners and centers of the faces copper, for example, are made of very thin cubes, with of each cube. The large crystals grow in such a direction that the atoms are arranged in columns along the length of the crystals. It is this regular arrangement of the atoms which, it is believed, give to the single crystals their superior conductivity when compared with ordinary (polycrystalline) copper in which the crystals are small and the arrangement of the atoms more chaotic.

So that no errors would be introduced because of differences in specimens, all were made with one staple. First, the conductivity of the single crystal was determined. Then the crystal was hammered, swaged and annealed so that its structure was destroyed and ordinary copper produced and the conductivity again determined.

THE METAL INDUSTRY

With Which Are Incorporated
THE ALUMINUM WORLD, COPPER and BRASS, THE BRASS FOUNDER and FINISHER
THE ELECTRO-PLATERS' REVIEW

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EDITORIAL

Retrospective Review of 1924—Outlook for 1925

The year 1924 was another to prove to us that it does not pay to have booms, for the simple reason that it takes so long to recover from the succeeding reactions. Even though there was no boom during that year, the same fluctuation was observed, only in a lesser degree. The first half of 1924 was quite good, but the second half fell off badly. This was attributed to any number of things, including politics and the fact that it was a presidential year, but there was small comfort in such reasoning. Purchases by the consuming industries dropped off and the brass and copper business suffered in consequence. The steel industry fell off to a point where it was operating at about only 40 per cent capacity, and this was partly a cause and partly an effect of the general situation. The electrical industries showed, as a whole, a lighter year than in 1923. The automobile industry slumped badly. However, the building trades held up very well, and finally after a long period of acute depression, agriculture in the fields of the wheat, corn and cotton came into its own. Due to failures of crops abroad, the prices of these commodities rose sharply, changing the whole aspect of the localities in which they predominated. This was the first sign of recovery. Then came election with its landslide for President Coolidge. The day afterward the New York Stock Market began to rise and has risen to heights, unprecedented since 1920. Opinions differ upon its value as an accurate index of business, but there is no question that it has reflected the state of mind of business, and that is the situation today.

Almost as a unit, the business public feel that 1925 will be a banner year. Nineteen twenty-three was good; 1924 was on the whole fair, but 1925 is expected to be big. So far actual business placed has not reached expectations except perhaps for seasonal trades. However, certain key industries have picked up remarkably, among them the steel industry, and throughout business in general there is undoubtedly strong feeling that prospects are better than they have been for a number of years.

METALS IN 1924

The tendency of the metal market, in a general way, was steady rather than sensational. Copper moved between 12½ and 13½ almost the whole year until the last two months when it has gone to 15. This condition is such as to make its adherents very optimistic, but the producing capacity of the copper industry is so large that unprejudiced observers will be very careful about entering the market for speculative purposes at prices above 15 cents a pound. Zinc has fluctuated largely around 6 cents a pound until recently when it has risen to almost 7½. Tin started at about 48½, climbed to 55, dropped to 43, climbed again to 52, went back to 49 and is now up again almost to 57. Lead has been very satisfactory throughout the whole year, rising as high as 9½, and although it dropped back to 7, has risen again to 9½. It has been consistently profitable throughout the whole year. Aluminum has been steady at 28 for the past eight months, and before that did not go above 29. Nickel, starting at 32, dropped to 30 and rose again to 33. Antimony has been another of the few really profitable metals, rising from its low point of 8½ in July to over 15 at the present time. Silver has been comparatively quiescent, but on the whole, good. Its low point was in April at about 63½ and its high point in October at about 71. At the present time it is over 68. Platinum, riding high at 125 in the early part of the year, dropped in May to 115, and since then has held between 115 and 120.

TECHNICAL ADVANCEMENT

While no startling developments took place along technical lines during 1924, nevertheless, there were a number of very important advances. These were largely sponsored by the various societies, and the work done under their guidance.

FLUXES AND DEOXIDIZERS

The Institute of Metals held a very interesting round table discussion at the New York Meeting in February on Fluxes and Deoxidizers. The utmost frankness prevailed, and the information brought forth at the meeting was valuable. The Committee in charge of this subject, headed by P. E. McKinney for the American Society for Testing Materials, is working now to formulate a set of instructions and standards which will enable the user of metals to know what he is doing when he either buys or uses specially prepared addition agents.

The American Society for Testing Materials continued its work in the development of standards and its triennial volume of standards, issued in 1924, contains all those developed to date.

MOLDING SAND RESEARCH

Probably the outstanding individual piece of work done during the year was the report of the Joint Committee on Molding Sand Research of the American Foundrymen's Association. This report outlined and detailed the tentatively adopted methods of tests of this Committee, covering the following points: Cohesiveness; Permeability; Fineness; Dye Absorption; Chemical Analysis; Method of Sampling, and Testing Equipment. This report is of utmost importance to the foundry industry and should be studied by every founder. A condensed version of this report will appear in an early issue of THE METAL INDUSTRY. In addition, the American Foundrymen's Association is also forking on the problem of training apprentices for the foundry industry, a long-felt need.

A prelminary step has been taken in the formation of a Committee on Non-Ferrous Metals, headed by J. L. Jones, to co-operate with Committee B-2 of the American Society for Testing Materials. This committee has already taken up test bars, bearings, aluminum alloys, fluxes and phosphor alloys. Subjects recommended for future action are permanent molds, centrifugal casting, die casting, green sand molding, and dry sand molding; these researches to be followed along the lines of processes rather than testing methods.

ZINC CAMPAIGN

The American Zinc Institute is preparing for a campaign to standardize the thickness of zinc coatings on sheet iron, and in addition has issued a Zinc Workers' Handbook, to give the necessary information to users of sheet and stripped zinc for the manufacture of pure zinc products.

ELECTRIC FURNACES

Electric furnaces have been gaining steadily if not sensationally. The Detroit Rocking now has over 172 installations totaling more than 30,000 K. W.; the Ajax-Wyatt, over 400 installations, totaling more than 25,000 K. W.

ROLLING MILLS

In this issue is an important article by W. A. Wood on the progress of the brass and copper industries. Mr. Wood's recommendations will be considered by all thoughtful men engaged in the rolling mill work as it shows the development of this field in the past, and points out a path for it to follow in the future. A discussion of his views should be not only interesting but most useful.

INSTITUTE OF ELECTRO-PLATING

At the annual meeting of the New York Branch of the American Electro-Platers' Society in February, C. H. Proctor recommended the foundation of an Institute of Electro-Plating. This is a project which may very well be undertaken and carried through, and if properly managed, will be of the greatest value to the plating industry.

PLATING RESEARCH

The American Electro-Platers' Society, through its cooperation with the Bureau of Standards by means of a Research Committee, has made real progress in the work of controlling nickel plating solutions; the measurement of acidity by means of hydrogen ion (pH); throwing power; purity of nickel salts, and tentative specifications for nickel anodes. Future researches at the Bureau will be undertaken on brass cyanide solutions; zinc plating; chrome plating; instruments for determining pH, and specifications for nickel and silver plates.

On its own initiative, the Boston Branch undertook an investigation into the causes and cures for nickel itch, directed by S. Herrick. This investigation resulted in the finding that most of the cases were due to carelessness, and can be prevented by cleanliness on the part of the plater. Prescriptions were recommended.

CADMIUM AND CHROMIUM

Considerable interest is still displayed in cadmium deposition, and chromium depositon has aroused everyone in any way connected with the plating industry. So far, chromium is not being plated commercially in great extent, but when some of the difficulties in its path are overcome, it should have a bright future.

The American Electrochemical Society held several very interesting symposia during the year; one on recent progress in electro-deposition, and another on refractories. This Society concentrated also on industrial electric heating, and corrosion, with particular emphasis on the effect of chromum in various forms as an aid to corrosion resistance.

Taken as a whole, 1924 was a year of sound, steady progress in the technique of manufacturing metals. There were no revolutionary changes, but a number of real advances which promise excellent results.

ECONOMIC DEVELOPMENTS

One feature of 1924 was the fact that the American Brass Company broke all records for production, turning out over 500,000,000 pounds of fabricated products. This was simply an indicator, which corroborated previously published statistics, of the fact that more copper would be consumed by the United States than ever before, totalling approximately 1,600,000,000 pounds. With improved conditions abroad, this should materially enhance the price of copper. The foreign situation seems to be very definitely improving, due to the acceptance of the Dawes' plan which, if nothing else, seems to have caused a resumption of work to replace the previous bickering.

It must be noted that concerning the price of copper, there has been considerable misapprehension about the producing costs of the mining companies. At one time it was supposed to cost, all except a few so-called low producers, 14 cents or more per pound of copper. Since then it has been stated in the press, at least, that Anaconda costs are not over 10½ cents per pound at their Butte mines, while Chilean copper can be produced for about 6 cents. This will explain the continued operation of the copper mines with prices averaging around 15 cents. An added complication is the fact that the low cost of Chilean and African copper is causing a demand for an American tariff on copper.

SECONDARY METALS

A move of importance in the secondary metal business was the formation of the Federated Metals Corporation, taking in some of the largest secondary smelters and refiners in the country. This very definitely proves that the scrap metal business is stabilized and should continue its steady development in the future. The size of the field can be gathered from the fact that it involves copper to the extent of $39,000,000; brass $58,000,000; lead $17,500,000; zinc $9,000,000; tin $12,500,000; aluminum $6,000,000; nickel $1,000,000, and with other miscellaneous metals, a total of almost $144,000,000.

PRECIOUS METALS

A Silver Producers' Association was formed to do for silver what the Copper and Brass Research Association has done for copper. This association will be watched with interest and encouragement.

The matter of legislation in the matter of the platinum group metals is up before the jewelry industry, and is still unsettled. The subject is very complicated, involving many details, but in a sense it is also very simple. We can only repeat what we have stated previously, to the effect that a really sound, all-inclusive act will have to be passed and should be drawn without delay. Its function will be to prevent deception and at the same time preserve the precious platinum and iridium for its really most important uses, laboratory and industry. As stated by Miss C. M. Hoke before the American Chemical Society, "the flooding of the market with adulterated methods has brought about an alarming loss of integrity and moral fiber among jewelers, and this is probably the most important phase of the matter from the humanitarian standpoint."

DEPARTMENT OF COMMERCE

In the Department of Commerce, the Division of Simplified Practice is busy cutting down unnecessary lines, styles, types and sizes. The Federal Specifications Board is working on a set of standard purchasing specifications for the Government, which will be published and will be of immense value to industry in recommending both purchases and manufactures.

From the figures of the Bureau of the Census, it is impossible to ascertain anything for 1924, since the work of collecting these figures is so vast that they are always a year behind. From preliminary information gained, however, it would seem that the business done was not so large as in 1923, but considerably larger than the dull years preceding.

NECROLOGY

Among the men of prominence in the metal industries who passed away during 1924, were: William Hoopes, chief engineer, Aluminum Company of America; Bernard Schutz, president Eagle Smelting and Refining Company; Edward Sawyer, president Atlantic Wire and Cable Company; Edward C. Goshorn, general manager National Lead Company; Luther J. Turner, president Turner & Seymour Manufacturing Company; John F. Alvord, president, the Torrington Company; A. Gardiner Cooper, Bruce & Cook; Sali B. Moers, E. M. Moers' Sons; Eliphalet Remington, E. Remington & Sons; George Edward Long, vice-president Joseph Dixon Crucible Company; Theodore Eaton Conklin, president T. E.

Conklin Brass & Copper Company; Dr. Heinrich Oscar Hofman, professor of metallurgy, Massachusetts Institute of Technology; H. M. Swetland, president United Publishers' Corporation, publishers of The Iron Age; James Hunter Sleeth, general foundry foreman Westinghouse Air Brake Company; William W. Smith, president John Hassall, Inc.; S. Olin Johnson, president Penberthy Injector Company; George Edwards Judd, president Mattatuck Manufacturing Company; Patrick Powers, superintendent of metal mills, Rome Brass & Copper Company; Captain Harry George, metallurgist the Chase Companies; Edwin C. Henn, director National Acme Company; Charles H. Harrub, chief engineer, Waterbury Brass Company and American Brass Company; Henry Robinson Towne, chairman of the board, Yale & Towne Manufacturing Company; Captain Patrick F. Bannon, president Farrell Foundry & Machine Company; Ernest Roth, president Western Clock Company and vice-president Matthiessen & Hegeler Zinc Company; John William Earle, chairman Earle, Bourne & Company, Ltd. (England).

OUTLOOK FOR 1925

At the present writing the outlook for the coming year is decidedly good. Secretary Hoover, of the Department of Commerce, who is known as a careful and trustworthy judge, is decidedly optimistic. Alfred P. Sloan, Jr., president of the General Motors Corporation, speaking for the automobile industry, expects 1925 to equal 1923. Charles M. Schwab, chairman of the Bethlehem Steel Corporation expects national and general prosperity, such as we have not witnessed for several years. A. L. Humphrey, president of the Westinghouse Air Brake Company, believes that indications point strongly to 1925 being one of the banner years. Charles G. DuBois, president of the Western Electric Company, predicts that industry generally will be somewhat more active during 1925 than during 1924. W. D. Baldwin, chairman of the Otis Elevator Company, points out that indications are in 1925, that the volume of business in the elevator industry, which depends, of course, directly on the building industry, will equal that of 1923. Agriculture, as everyone knows, has taken a new lease on life, due to the rise in prices. These men represent, to a great extent, the industries which consume metals and their prosperity means prosperity for the metal trades.

It is safe to feel, therefore, that the first part, at least, of 1925 will be prosperous. What will happen in the latter half, depends upon the care with which this prosperity is husbanded, the continued stabilization of conditons abroad, and extreme care by our bankers and manufacturers. The lesson of 1920 should not be forgotten; better a whole year on an even keel than a boom followed by a decline.

CORRESPONDENCE and DISCUSSION

Although we cordially inyite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein

A Letter and Opinion From a Former Rolling Mill President

To the Editor of THE METAL INDUSTRY:

I am very much obliged to be in receipt of your recent publication giving the interesting article on the Michigan Copper and Brass Company.

This brings me back to the time when I organized and built this company and I feel proud today (while I sold my interest, perhaps too early) to see the large increase; something like four times larger than when I built the works and thought at that time it was large. They are doing a wonderfully nice business and the article and illustrations showing the different scenes is very attractive.

I have lately written my opinion regarding the business outlook for 1925 and I am sending copies to the papers here in the city and thought you, perhaps, would like to have a copy and you can use your own pleasure about publishing it.

The article expresses myself as being optimistic and I am and believe that not only in manufacturing lines but in all lines there is a most favorable outlook for business and a prosperous year in 1925.

Wishing you a Happy New Year and with kind regards, believe me,

GEORGE H. BARBOUR

Chairman Board Directors, The Michigan Stove Company.

Detroit, December 31, 1924.

MR. BARBOUR'S OPINION ON THE BUSINESS OUTLOOK FOR 1925

I am and always have been on the optimistic side, and today, I am more optimistic than ever. Since the election of Coolidge and Dawes, we have every reason to feel that the unrest which has prevailed to a greater or less extent all over this country has already begun to diminish. A better feeling and more confidence will show itself from time to time, and this cannot help but have its good effect on business.

It is a source of great satisfaction to know what is being published at the present time in connection with the improvements that have taken place in the agricultural districts. We have during the last two years seen more published concerning the farmer. Today, the country at large knows more of the condition of the farmer than ever before, and it is good thing. Farmers are an important factor; if they fail to produce good crops the general public suffers.

The railroads are all in a much improved condition from what they were five years ago, and they have been able greatly to improve general conditions and general equipment; also their income has increased. This situation is for the good of the traveling public and as well all interests that have to do with freight.

It is estimated that the production of the manufacturers of the United States in 1923 was some sixty billion dollars, or two and one-half times as much as in 1914, five times as much as in 1903 or ten times as much as in 1880. In a third of a century we have increased the value of articles produced a large percentage. For 1924, while we may not have a large increase in our manufacturing institutions, we have reason to believe that we will not show much if any decreases, even though the textile manufacturers have suffered. The producers of iron and steel products are already feeling the recent improvements. Many of the iron furnaces that were idle are now in blast, and the steel mills as well have been securing additional orders, coming near their capacity of production. The same is true of coke furnaces.

Now that the great question of who is to be President and Vice-president is settled, and our people at large by their vote have shown their confidence, we must stand by and give them every assistance, and we will not be disappointed. Let us work for improvement all along the line, in all departments of business and first prepare ourselves to accommodate the improved business that seems to be in store for us.

New Books

The Corrosion of Metals. By Ulick R. Evans. Published by Longmans, Green & Company. Size 5½ x 9, 212 pages. Price, payable in advance, $5.00. For sale by THE METAL INDUSTRY.

This book, written by Mr. Evans, who has already a number of scholarly works to his credit, emphasizes the essential mechanism of the changes involved in corrosion. It is intended as a help to the practical engineer or works metallurgist, who needs scientific principles to arrange in an orderly fashion, the disconnected facts he has gathered in his experience, and to help him prepare against new difficulties in the future. It is also useful for the investigator engaged in research in corrosion, and the student of metallurgy and chemistry. The book deals largely with general principles, basic phenomena, and their causes and effects; also methods of prevention.

The topics covered are as follows: Historical Survey; Direct Chemical Combination of Metals with Non-Metals; Anodic Corrosion by Means of an Externally Applied Current; Corrosion Involving the Production of Hydrogen Gas; Corrosion Involving the Presence of Dissolved Oxygen; Effect of Oxidizing Agents on Metals; Corrosion of Copper and Copper Alloys; Corrosion and Tarnishing in a Moist and Polluted Atmosphere; Factors Affecting the Velocity of Corrosion; Prevention of Corrosion; Corrosion-Resisting Materials; Summary of the Behavior of Individual Metals to Different Corrosive Agencies (for Reference Purposes).

Fluxes and Slags in Metal Melting and Working. A general discussion held by the Faraday Society, and the Institute of Metals. Published by the Faraday Socie y, 90 Great Russell street, London, W. C. 1, England.

This is a compilation of a symposium the discussions held at a joint meeting of the above societies with the co-operation of the British Non-Ferrous Metals Research Association, and the Institute of British Foundrymen. The papers read included the following:

Introductory Address on the Physical Chemistry of Slags and Fluxes in the Non-Ferrous Metal Industries. By Professor C. H. Desch.

Oxidizing Fluxes in the Melting of Non-Ferrous Metals. By A. Portevin.

The Use of Fluxes in Brass Melting. By R. Genders and M. A. Haughton.

Note on Slags from Lead, Copper and other Blast Furnaces. By Gilbert Rigg.

Slags Produced in Melting Silver Alloys. By J. Phelps.

Sulphurizing and Desulphurizing of Metals by Basic Slags and Fluxes. By B. Bogitch.

Fluxes and Slags in Oxy-Acetylene Welding. By C. Coulson-Smith.

Fluxes and Slags in Welding. By W. Spraragen.

The Use of Fluxes in the Melting of Aluminum and Its Alloys. By W. Rosenhain and S. L. Archbutt.

A Note on Non-Metallic Inclusions in Metals, with Special Reference to Aluminum. By A. G. Lobley.

Fluxes for Soft Soldering. By T. B. Crow.

Chemical Engineering Catalog. Published by The Chemical Catalog Company. Sixe 9 x 12, 1,080 pages. Price $10.00 to all except those engaged in working or teaching in the chemical industries, and in the technical departments of the Government and libraries. To those the catalog is leased at $2.00 per copy for one year.

The Chemical Engineering Catalog is a standard work of reference for those who use, buy and specify equipment and materials in the industries using chemical processes. It is a compilation of catalog data standardized as to page, size and typographical arrangement and supplemented by a classified index of equipment, supplies and materials. It is published annually under the supervision of an official committee of the American Institute of Chemical Engineers, The American Chemical Society, and the Society of the Chemical Industry.

All lines of the chemical industry are included and of course, among these lines, those using or producing metals play a large part. Engineering catalogs have become standard reference books in every technical library.

Technical Papers

Film Protection As a Factor In Corrosion.* By FRANK N. SPELLER.

It has taken several years of practical experimenting, after the cause of corrosion of iron in closed water systems was understood, to bring these principles into practical use. With the mechanical de-aerator and de-activator for removing oxygen, the problem seems to be solved for large closed systems, while the smaller ones, we believe, can be taken care of, to a large extent at least, by the use of film-forming compounds. The question of whether or not it is practicable and economical to use sodium silicate on a large scale in cold water supplies remains to be answered, but it seems highly probable that this can be done. With some domestic waters, lime may be used to advantage, if applied with careful control. There seems to be no doubt as to the benefit to be derived from the proper use of protective films in retarding the corrosion of iron, lead, brass and other metals.

Tests for Grading Corrosion-Resisting Alloys. By WM. E. ERICKSON AND L. A. KIRST.*

As a rapid method of selecting from a large number of iron alloys those which would possess the rust-resisting qualities of stainless steel, Kurtz and Zaumeyer' applied an acidified solution of copper sulfate to the cleaned metal surfact. While this test probably detected all alloys having marked resistance to corrosion, it did not differentiate between those of high and those of only moderate resistance. The experiments, results of which are here reported, were undertaken in the hope of separating these alloys into several groups according to their resistance to corrosion. The alloys were tested with solution of $CuSO_4$, $AgNO_3$, $PtCl_4$, $AuCl_3$ and $PdCl_4$. Of the common metals silicon and chromium appear to be the most resistant to corrosion. The addition of either or both of these elements to iron reduces the corrodibility very appreciably.

* A paper presented at the forty-sixth general meeting of the American Electro-Chemical Society, held in Detroit, Mich., October 2, 3 and 4, 1924.

A study of the Effect of Heat on the Clay Content of Molding Sands as Shown by the Dye Adsorption Test.† By R. F. HARRINGTON, W. L. MACCOMB AND M. A. HOSMER.

This paper discusses the data obtained from an investigation of the properties of the clay content of molding sands as represented in sands such as co-called Millville gravels. Several years of practical experience had indicated that the clay content of these gravels varied appreciably even when mechanical analysis and dye adsorption values on the raw material disclosed no wide variation. Samples of the sands were heated to varying degrees of temperature and were then tested by the dye adsorption method. The results of the test show these sands vary in their retention of bonding properties when used for molding purposes.

Commercial Application of Molding Sand Testing.† By H. W. DIETERT.

This paper deals with the testing of foundry sands in the plant of the U. S. Radiator Corporation. As sand losses comprise one of the chief sources of defective castings, this plant has installed a sand testing laboratory to control the daily shop conditions of the sand heap. Permeability, strength and moisture content are three factors kept under daily control. The A. F. A. permeability test method is followed in abtaining permeability data. Special compression tests and moisture determination methods are used.

Charts are given which show how losses have been reduced by laboratory control. It is stated that not only has the casting loss been reduced, but the casting finish improved, less new sand used, definite location of certain defective sources determined, and a reduction of excess weight of casting secured by running a thinner metal line when sand qualities are controlled.

† A paper presented at the Milwaukee Meeting of the American Foundrymen's Association, October 11-16, 1924.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ASSOCIATE EDITORS { WILLIAM J. REARDON, Foundry; JESSE L. JONES, Metallurgical; PETER W. BLAIR, Mechanical; WILLIAM J. PETTIS, Rolling Mill; CHARLES H. PROCTOR, Plating-Chemical; R. E. SEARCH, Exchange-Research

ALUMINUM ALLOY

Q.—We are desirous of obtaining a formula of aluminum alloy casting that will retain an average tensile strength and yet decrease to the minimum the proportion of aluminum content. Can you give us a formula where we can add spelter or cheaper ingredient to the basic metal?

A.—The formula we would suggest that will meet your requirements, and give you an average tensile strength of approximately 30,000 lbs. per sq. in., is composed of 66⅔ zinc; 33⅓ aluminum. This mixture makes very fine castings. —W. J. R., Problem 3,308.

BRONZE SKIMMINGS

Q.—We would like to know if you can tell us of a flux that can be added to bronze skimmings that will enable us to use them the same as we melt and use aluminum skimmings.

A.—One of the best methods to handle foundry skimmings is to wash them in a rumbling barrel made for that purpose, and get all the sand out. Then melt in open flame furnace using a flux composed of three parts fluorspar, two parts lime and use one pound to the hundred of skimmings. Also use a handful of salt to the heat. When melted skim off slag and pour into ingots.

Crucibles can also be used for this work, and in small foundries this is the practice. It is more expensive than the open flame furnace, but not so much it would not pay you to run down your skimmings. It will surprise you to see how much metal you will recover.—W. J. R., Problem 3,309.

BRONZING STEEL BUCKLES

Q.—We are sending to you under separate cover three shoe buckles, one with the natural cut steel color, another one that we gilt plated, and the third one a bronze color. What we desire is to obtain the bronze color. The finish as it is, is made in France. We import these buckles in the cut steel and in the bronze. We think that perhaps you may be able to advise us how to make this bronze color after plating.

A.—We have made a careful examination of the cut steel buckles, submitted to us—one in plain cut steel, one gold plated, and another bronze finish, such as produced in France. We have given the bronze finish our special attention and have concluded that the finish is not an oxidized or chemical one but is produced by oxidizing chemicals with the aid of heat, approximately 500° F.

It will be noted by examining your sample bronze buckle carefully (especially the back) that the buckle front has been finished separately, the back gold plated separately, and then riveted to the front. This is indicated by the rivets showing a steel color instead of gold.

It is our opinion that if you want to duplicate the bronze buckle in its entirety—that is the bronze front and the gold back, you will have to use the following methods:

1. Gold plate the buckles as thinly as possible—just enough so that the gold will cover the back.
2. Buff the gold from the front of the buckle so that the steel is completely uncovered and bright.
3. Wash in benzine to remove buff dirt, and dry out very carefully in boxwood sawdust. It may, however, be possible to eliminate this operation after experimenting.
4. Following the second or third operations, the buckles, perfectly dry, should be immersed in a molten mixture of 2 parts sodium nitrate and 1 part sodium nitrate, heated in an iron kettle to approximately 450-500°.

If a perfect control is obtained of heat conditions, the time of immersion of the buckles will be probably 30 seconds. As soon as the bronze finish is produced, immerse the buckles in hot water; drain them well, immerse in denatured alcohol and dry out in boxwood sawdust. It is our opinion that the finish on the bronze buckle is produced as outlined, and is a heat bronze finish. Experiment accordingly and modify your procedure as you may find it necessary. No additions must be made to the sodium nitrite, and nitrate. Merely heat the combined mixture in an iron kettle until it becomes fluid, which will be below 400° F.—C. H. P., Problem 3,310.

CASTING BRASS IN OPEN MOLD

Q.—I take the liberty to inquire if it is possible to cast brass in an open mold. The ingot of brass to be from ½" to 1" in thickness. Is it possible in some way to prevent the shrinkage in the centre of the brass ingot when it cools? What I want is a perfect ingot of brass cast in an open mold which can be rolled down cold to any desired thickness, but the rolled metal must not show any imperfection from shrinkage; also with gold alloys and copper.

A.—We are sorry to say we do not know of any method to cast brass ingots from ½ to 1" in thickness that will not show shrinkage in the centre.

With pure copper this is possible, if the copper is of the proper pitch, but it would be difficult to cast in the thickness of ½" to 1". If it is to be rolled, why not increase the thickness to 1½", when it would not be so difficult to cast. We are of the opinion you would have a very hard time casting any metal the thickness you desire in open molds. We would suggest sand molds for this work, and suitable risers to be put on the casting to take up the shrinkage. If the metal is properly handled, very good results should be obtained in either brass, copper or gold.—W. J. R., Problem 3,311.

CRYSTALLIZED BRASS FINISH

Q.—I am mailing you today under separate cover, marked for your personal attention, a sample of a special finish applied to a cast brass plate, and would appreciate your sending the writer a list of the operations necessary to produce this finish—both on cast brass and rolled brass.

A.—The finish on the sample piece of cast brass is what is commercially termed the crystallized brass finish.

This finish is readily produced upon cast brass containing small amounts of aluminum, ½ to 1 per cent. It is very difficult to produce the finish on sheet brass. There are two methods of preparing the finish—the electro, and dip.

The electro consists of copper plating the brass surface for a minute or two in a regular acid copper sulphate solution, composed as follows.

Water	1 gal.
Copper sulphate	16 ozs.
Muriatic acid	1 gal.

As soon as the brass in uniformly coated, the current should be reversed and the copper withdrawn; as soon as this is accomplished, the crystallized finish will result.

Wash the articles in water; immerse them in a cyanide dip; rewash in cold and hot waters; dry out and lacquer. The lacquer should consist of a heavy brush brass gum lacquer.

The chemical method consists of adding copper sulphate to a solution of muriatic acid 4 to 8 oz. copper previously dissolved in as little boiling water as possible. Cast brass gives good results. Sheet brass gives more of an antique brass tone. After the crystallized finish is produced, proceed as before mentioned.—C. H. P., Problem 3,312.

NICKEL IN BRONZE BUSHINGS

Q.—As we are engaged in the manufacture of bronze bushings we would thank you to give us a formula, including percentage of nickel to add in order to obtain best bronze bushings.

A.—Nickel is generally added to bearing bronze to hold the lead and tin and give a close grain. The percentage added to a good bronze bushing (one that is said to give very good results), consists of 79.5 copper, 10 tin, 10 lead, ½ of copper nickel alloy, consisting of 50 per cent copper and 50 per cent nickel. This alloy is make by melting 50 lbs. of copper and 50 lbs. of nickel under a cover of charcoal. Stir well and pour in ingots and use as directed, ½ lb. to the hundred pounds of bronze. —W. J. R., Problem 3,313.

OXIDIZED BRASS

Q.—We have a number of brass pieces at our factory which requires and oxidized brass finish. What suggestions would you offer for making a dipping solution to turn these pieces black.

A.—Either of the following formulae will give you a black finish suitable to produce an oxidized brass finish.

No. 1 gives the blackest tone. No. 2 is used by hardware manufacturers to produce the antique brass finish on builders' hardware.

No. 1

Aqua-ammonia 26°	1 qt.
Dry carbonate of copper	16 ozs.
Sal soda crystals	8 ozs.
Water	2 gal.

Prepare the solution in the order given, then heat to 120° F.

No. 2

Water	1 gal.
Hyposulphite of soda	8 ozs.
Lead acetate	4 ozs.

Temp. 180° F.

The proportions given may be varied in solution No. 2, that is, the solution may be prepared weaker or stronger as may be found advisable.—C. H. P., Problem 3,314.

TARNISHED BRASS SHELL

Q.—We are forwarding to you under separate cover, one of our brass shells, which has, as you will notice, been oxidized with liver of sulphur and rubbed off with a cyanide solution. We are unable to define the condition appearing on the shell. This shell is a part of our lamps and was produced about seven months ago, then placed in our stock room, wrapped in paper and we found, on opening one today, the prevailing condition.

We would be very much obliged if you could assist us in ascertaining what is the cause of this disappearing of the oxidization. You will also notice that the shell is entirely covered with lacquer, consequently this condition must be caused from scourges within.

A.—You can trace your difficulties, as outlined, to your product lying for 7 months wrapped in ordinary tissue, and wrapping paper, and exposed to the humid, damp atmosphere for which Pittsburgh is noted, during July, August and September.

The paper used contains sulphites and when damp as outlined, sets up a chemical action upon the metal. The oxide or sulphide is thereby absorbed; the lacquer remains practically unaffected, because the base of the lacquer which is gun cotton, is not acted upon by sulphites.

Your trouble is one that is quite common under similar moisture conditions. Some day the metal goods manufacturers will learn the same lesson the cereal manufacturers learned many years ago. During the humid summer weather the paper cartons absorbed moisture and the product became unpalatable, and in many instances, worthless. They then resorted to waxed paper wrappings, either inside the cartons or outside. The results were that the food product was protected against atmospheric moisture. There are only two alternatives for manufacturers of metal goods who stock their goods during humid summer months, and that is to wrap their products in waxed tissue and wax wrapping paper. It should be so arranged that the summer stock room can be closed tight from atmospheric influence and heated with exhaust steam through radiators to keep any moisture absorbed, thereby preventing chemical action upon the finished product wrapped in paper which contains sulphites, and otherwise become continuously damp thus producing the chemical action you have noted.—C. H. P., Problem 3,315.

SOLDER FOR STEEL AND GILDING METAL

Q.—Please advise if it is possible to obtain a soldering compound for use where cold rolled steel and gilding metal are soldered together: compound to be one that will not rust with steel and to be non-injurious to the operator. These parts are to be nickel plated after soldering and the average soldering compound is difficult to remove from the steel before it is plated. This, of course, spoils the plating.

A.—There are several methods of preparing a non-corrosive soldering fluid. Canned goods manufacturers make use of a flux prepared from a saturated solution of powdered resin dissolved in denatured alcohol. The following formula should answer your purpose, and give you a non-corrosive flux.

Glycerin, by measure	65 parts
Lactic acid	49 parts
Ammonia ater, 26°	14 parts

The following is a self-fluxing solder:

Powdered tin or solder	40 lbs.
Powdered resin	8 lbs.
White Sal-ammoniac 98°	4 lbs.
Petrolatum	17 lbs.
Ceresine wax	12 ozs.

No solder or flux is necessary. They are contained in the above mixture.—C. H. P., Problem 3,316.

SULPHUR IN BRASS

Q.—We are mailing you under separate cover a sample of the castings we produce in our brass foundry. For some time we have been having trouble with our castings and we have tried every possible way to eliminate the trouble, but up to the present time we have not been successful.

For over a year we were using yellow brass. Our moulds are made of a fine grade brass sand purchased especially for making brass castings and we have tried working this sand in every possible way.

We use a coke-fired pit furnace, but do not have any method of determining the pouring temperature of our brass. Our foreman judges this temperature as best he can by sight.

At the present time we are not using anything to clean the molten metal, but in post years we have used various chemicals supposed to act as a flux and cleaner.

A.—On examination of the sample casting, we are of the opinion that your trouble may be due to sulphur in the metal. We would suggest you look to the coke you are using, and also have an analysis made of the ingot you are using for sulphur. As you state, for years you have been handling yellow brass with success, so the trouble appears to be either in the ingot, or the coke contains a higher sulphur content than what you have been using. Metal containing 0.10 sulphur is very hard to get good castings from. However, you can help it by using plenty of charcoal in melting and the liberal use of salt as a deoxidizer. Having an analysis made for sulphur may give you the cause of your trouble.—W. J. R., Problem 3,317.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,513,875. November 4, 1924. **Method of Melting Scrap Metal.** Erwin L. Wilke, Hammond, Ind., assignor to Metals Refining Company, Hammond, Ind.

The method of melting scrap metal, which consists in introducing the scrap into a moving stream of molten metal, and discharging the mixture of the stream into a separating device for removing the nonmelted portions of scrap therefrom.

1,513,989. November 4, 1924. **Method of Deoxidizing and Cleaning Metals and Alloys.** Bertel O. Henning, Chicago, Ill.

The method of deoxidizing and cleaning metals and alloys, which consists in introducing a mixture of steam and volatilized boric acid into the molten metal or alloy.

1,514,064. November 4, 1924. **Alloy Intended for Castings.** Ambrose Joseph Mandell, Forest Hills, N. Y.

An alloy intended for use in casting, composed predominantly of nickel with a materially less percentage of silicon.

1,514,235. November 4, 1924. **Cleaning and Polishing Compound.** Emil M. Smith, Milwaukee, Wis.

A polishing compound formed by the mixture of oxalic acid, rotten stone, ammonia and water.

1,514,494. November 4, 1924. **Rust Remover and Preventative.** Glen Lenardo Williams, Detroit, Mich., assignor to Randall Williams, Company, Detroit, Mich.

A liquid for removing rust and for producing a rust preventative coating, containing sugar factory refuse, aqua regia, and a phosphate of a metal electro-positive to iron.

1,514,793. November 11, 1924. **Electroplating Machine.** Hedley J. Richards, St. Louis, Mo., assignor to Lasalco, Inc., St. Louis, Mo.

An electroplating machine comprising a tank, means for supporting a series of anodes near the wall of the tank, a hollow shaft, a support for cathodes attached to said shaft, a shaft extending vertically through the hollow shaft and to a point below the lower end thereof within the tank, a support for anodes attached to said second shaft, and mechanism for rotating said shafts simultaneously in opposite directions.

1,515,042. November 11, 1924. **Electrolyte and Composition for Forming the Same.** August Heck, Philadelphia, Pa.

An electrolyte for use in electro-deposition of metals consisting of a solution in water of an appreciable amount of cyanide of an alkali metal, together with a mixture of solutions of cyanide of the metal to be deposited, and boracic acid, the latter ingredients being present in relatively large amounts.

1,515,082. November 11, 1924. **Method of Making Light Metal Alloys.** William R. Veazey, Cleveland, Ohio, assignor to The Dow Chemical Company, Midland, Mich.

The method of causing magnesium to adhere to iron, which consists in applying an admixture of beryllium with such magnesium while in molten state in contact with the iron article to be coated.

1,515,092. November 11, 1924. **Process and Apparatus for Coating Wire and Other Drawn and Rolled Sections with Other Metals.** Sherard Osborn Cowper-Coles, Sunbury-on-Thames, England.

A process for electroplating wire and the like which consists in passing the said wire through an electrolyte and over the anodes and simultaneously subjecting the same to a rapid oscillating or reciprocating motion sufficient to throw off the adherent film of electrolyte.

1,515,137. November 11, 1924. **System for Making Lead Castings.** Chester M. Angell, Chicago, Ill., assignor to Vesta Battery Corporation, of Illinois.

In a plant for making castings, a plurality of furnaces, a conveyor moving continuously in a circuit past each of said furnaces, and molds carried on said conveyor and adapted to be filled from said furnaces, the speed of the conveyor with relation to the distance between the furnaces being such that there is time for workmen adjacent the conveyor to discharge and recondition each mold while it is passing.

1,515,658. November 18, 1924. **Process for Coating Aluminum.** Thomas Charles Cole, Southbridge, Mass.

A process for plating aluminum articles, first consisting in preparing the article by immersing the same in a solution of substantially one part sal soda and substantially thirty-two parts water, be weight, charging the solution with a substantial steady current of electricity, the electro-chemical action of the solution rapidly cleansing the aluminum article, rendering the surface thereof more susceptible to a subsequent substantial permanent plating, then removing the article from the electrified cleansing solution, and immersing it in a bath of copper cyanide saturated solution which is subjected to heat substantially one hundred and ninety degrees Fahrenheit, thereby generating a galvanic action which, due to the surface having previously received its preparation from the electro-chemical action, the aluminum article will take on a substantial permanent plating.

1,515,712. November 18, 1924. **Mercury Zinc Anode for Sulphate Solutions.** Christian John Wernlund, Tottenville, N. Y., assignor to The Roessler & Hasslacher Chemical Co., New York, N. Y.

The combination with an acid zinc electroplating bath, of an alloy anode containing zinc and a small percentage of mercury whereby to stabilize the bath.

1,515,870. November 18, 1924. **Metal-Polish Compound.** Esther E. Nelson, Chicago, Ill.

The herein described composition of matter for polishing copper, silver and other metals, consisting of sodium carbonate, two ounces; aqua ammonia, one ounce; benzine, one ounce; water, one and one-half pints; whiting, one pound; and oxalic acid, one and one-half ounces.

1,515,950. November 18, 1924. **Metal Polish.** Harry Hildenbrand, New York, N. Y.

A metal polishing composition composed of the following ingredients substantially in the proportions given, viz., 16 parts marble dust, 16 parts water, 1 part aqua-ammonia, 18 parts kerosene, 2 parts acid oleinic and 1 part lemon-oil.

1,516,122. November 18, 1924. **Galvanizing Apparatus.** John C. Scarles, Oakland, Calif., assignor to California Wire Cloth Company, Oakland, Calif.

A galvanizing apparatus including a tank, sets of anodes suspended in said tank in superposed spaced relation, a plurality of rollers arranged in pairs in the space between the sets and journaled in said tank, between which rollers the material to be galvanized is fed.

1,516,804. November 25, 1924. **Method and Apparatus for Gauging Castings.** Erwin L. Wilke, Hammond, and James O. Johnstone, East Chicago, Ind., assignors to Metal Refining Company, Hammond, Ind.

The method of determining the highest grade of castings from any given metal, which consists in determining the mold and metal temperatures required for such castings.

1,517,097. November 25, 1924. **Method and Apparatus for Treating Plates Prior to Lacquering or the Like.** Abraham Podel, Long Island City, N. Y., assignor to Anchor Cap and Closure Corporation, Long Island City, N. Y.

The method of treating tinned sheets, or the like, to remove deleterious material, which method comprises subjecting the surface of the sheet to a burning flame to volatilize or incinerate combustible materials on the surface of the sheet to produce granular materials.

1,517,354. December 2, 1924. **Process for Improving Metals and Alloys in Resistance to Repeated Stress.** Horace W. Gillett, Ithaca, N. Y.

The process of strengthening metals or alloys in their endurance against repeated stress by subjecting them to repeated stress of magnitude not greater than the stress corresponding to the endurance limit of the material.

1,517,631. December 2, 1924. **Anode for Use in Electroplating.** Giraldus Jones, Birmingham, England.

An anode for use in electro-deposition of metals comprising in combination a container with perforated walls, means for suspending said container, means for introducing anode metal in divided form into said container, current conveying means in said container disposed so that the anode metal when in the container will rest on a portion of said current conveying means, and said current conveying means being protected on all sides from the electrolyte except the portion on which said anode metal will rest. (See also Pat. No. 1,517,630.)

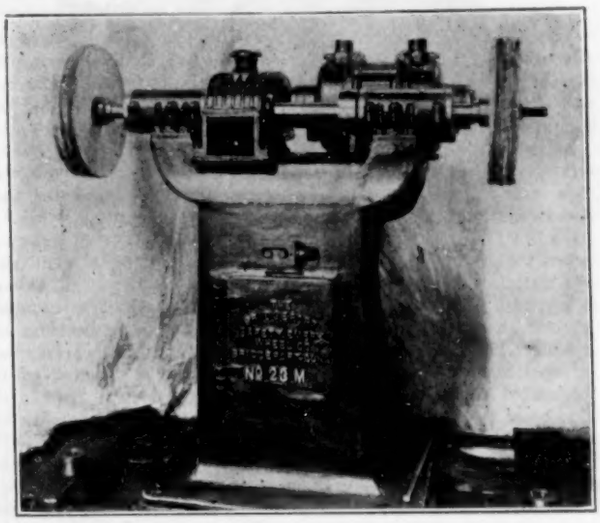
EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

NEW BUFFING LATHE

Alternating current motors of 60 cycle, 2 or 3 phase, have to be wound to run 1,800 or 3,600 r.p.m. For buffing, the 1,800 r.p.m. speed is rather slow unless extra large buffs are used; the 3,600 r.p.m. is a very high speed unless small sized buffs are used. To get around these conditions, the Bridgeport Safety Emery Wheel Company, Inc., of Bridgeport, Conn., has brought out three sizes of alternating current buffing lathes using a silent chain to connect the motor to buffing spindle. By using appropriate sizes of chain sprockets, they can bring the buff spindle within close range of the speed desired.

The machine pedestal is cast with a bracket on the back upon which the driving motor is mounted. This brings the center of the motor shaft horizontally back to the buffing spindle, and the two are connected with the silent chain drive. This chain runs in an oil-tight case with an oil bath in the bottom, which insures continual and positive lubrication. Both motor spindle and buffing spindle run in ball bearings, the buffing spindle having four sets, one at each end of each box, the boxes being provided with a large oil reservoir into which the balls dip half their diameter at each revolution of the spindle. The ball bearing construction is such that they are said to have had mountings of this type running for twelve years and more without failure of the ball bearings. But in case they ever wear out, they are of the best standard make, stock sizes, and are easily replaced without any fitting.



BRIDGEPORT BUFFING LATHE

PARKER PLATING BARREL

The Parker plating barrel, made by the Parker Rust-Proof Company of Detroit, Mich., is designed to fill the demand for a plating barrel that can be depended upon for hard continuous service.

Mechanically, the barrel is said to be very strong. There are no working parts under the solution. The driving mechanism is the same as has been used on Parker processing barrels for the past nine years and is sufficiently strong to last indefinitely without adjustment or repair.

Electrically, the connections are positive. The cathode rod is used for one bearing. Electrical connection is made through this bearing in a positive and substantial manner. The cathode rod is covered with Bakelite tubing except the connections for the danglers which transmit the current to the work.

In addition to these, another advantage is claimed. The turning of a plating barrel by a ratchet movement has a distinct advantage in that the solution is kept properly agitated with one-third to one-half the number of revolutions per minute. When the barrel is turned intermittently by the ratchet movement, the barrel is being turned approximately one-third of the time and the balance of the time it is standing still. It is well known that the plating is more rapid when the barrel is still than when it is turning. These facts give this barrel a definite advantage over a barrel which has a continuous drive. The plating is done more rapidly and the tendency of the articles to become scratched or marred is substantially lessened, due to the reduced tumbling action at lower revolutions per minute.

PARKER PLATING BARREL

THE RESEARCH SERVICE

A new and interesting type of work has been organized by The Research Service, Washington, D. C. It consists of the service of a group of engineers, prepared to do consulting engineering work in the fields of civil engineering and metallurgy, and also Government liaison work in the fields of education, economics and business.

The activities of numerous business mens' associations and the operations of many corporations frequently require contacts with government officials and extensive investigations which may be greatly facilitated by data procurable from some of the many government bureaus.

The national capital is not only the center of political activity vitally affecting business, but it has now become the center of scientific research for the United States. A veritable mine of information on a vast variety of subjects is here available, but can best be worked through personal contacts and by men who "know the ropes."

The Research Service offers a Washington connection for organizations or industries at a reasonable cost. Its clients are relieved of the greater expense of a Washington office, while receiving the advantages of dealing through an organization whose members are qualified both by wide personal acquaintance with the "powers that be" and long years of training in research work to get the facts that may be required in the most thorough and expeditious manner.

W. M. Corse, secretary-treasurer of the Institute of Metals

Division, is vice-president and general manager of the organization. Mr. Corse is still doing metallurgical work for the International Nickel Company, and is secretary of the Board of Trustees of the International Critical Tables of Chemical and Physical Data at the National Research Council, also chairman of the Corrosion Committee of that Council.

Other officers of this Company are F. H. Newell and A. B. McDaniel, both prominent civil engineers.

BALL BEARING FLOOR-TYPE GRINDERS

The Mitchell Engineering Company of Springfield, Ohio, is now offering the trade a new line of ball bearing grinders, incorporating the same features of bearing mounting and unit spindle construction as embodied in its line of ball bearing polishing and buffing machinery.

To obtain the greatest possible output and efficiency of any abrasive wheels, these must be rigidly and substantially mounted. It is claimed that they have under, rather than over-rated their wheel carrying capacity, as is the common practice.

Bearings are of the highest grade American manufacture, guaranteed by the manufacturer and the Mitchell Company. Ball bearings not only effect a great saving in power consumption, as well as lubricant, give greater efficiency of wheels and increase output, but will also many times outlast the very best plain bearings obtainable. Then when replacements are necessary, ball bearings may be replaced in a fraction of the time, and at a fraction of the expense of replacing the plain bearings, nor does it require the services of a skilled mechanic to make these replacements with our construction.

In Fig. 1 is shown the unit spindle assembly with bearing housings, pulleys and flanges mounted. To remove from pedestal or base of machine it is only necessary to release the four nuts holding bearing housing clamps. Patents are pending on this construction.

By referring to Fig. 2 showing bearing mounting and spindle assembly, it will be noted that the extra heavy spindles of high carbon steel, are the same diameter their entire length except where wheels go on. On all machines are employed ball and socket type of bearing housing, insuring absolute alignment of spindle, and bearings and an equal distribution of load.

When desired, we are in position to furnish these machines with an improved exhaust type wheel guard, which in addition to meeting the safety code of every State in the Union, is of attractive appearance. It is only necessary to remove the outer cover for changing wheels. Made in right and left hand, and in ordering it is necessary to state whether right or left hand guards or both are wanted.

FIG. 1. UNIT SPINDLE ASSEMBLY MITCHELL GRINDER

These grinders are manufactured by the Mitchell Engineering Company, and exclusively distributed by Frederic B. Stevens, Incorporated, of Detroit, Mich.

FIG. 2. BEARING MOUNTING AND SPINDLE ASSEMBLY

BENZ OIL ENGINES

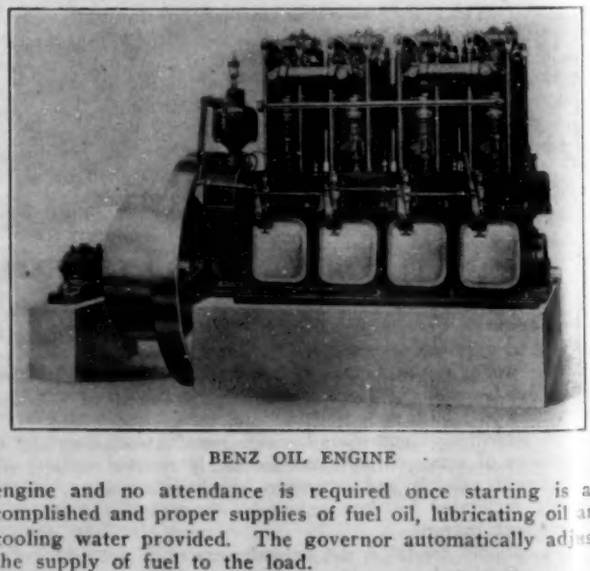
The Stewart-Sayres Company, 50 Church street, New York, is marketing the Benz oil engine, in conjunction with Marvin & Company, Ltd., of America, 30 Church street, New York. The engine is recommended for use in brass mills, machine shops and all manufacturing plants where power is required.

The Benz high pressure crude oil engine is essentially a Diesel engine and was developed by the manufacturers of the German Benz automobile, from their more complicated Diesel engine with external air compressor. The type shown here is built in sizes from 5½ HP. to 210 HP. and uses no air compressor for the injection of the fuel. It is what is called in this country, a solid injection type of Diesel.

The chief advantage claimed over the compressor type of Diesel is its simplicity—the air compressor adding a multiplicity of parts with corresponding increase in price and necessary attendance. Unlike the so-called semi-Diesel engines, it does not rely for ignition on hot balls, hot bulbs or hot tubes, all of which must be heated prior to starting by a gasoline torch or some electrical heating device. The Benz starts cold.

Moreover, the Benz is said to have a fuel economy much superior to semi-Diesel engines; in fact, its economy even in very small sizes approaches that obtained by large compressor type Diesels, and it will burn the same oil as the latter type—heavy and cheap oils that the semi-Diesels cannot burn. With a Benz engine and fuel oil at 6½ cents per gallon, the cost per BHP/Hour is less than .4 cent. With lubricating oil included, this figure would not be over ½ cent. Fuel oil is very much cheaper than 6½ cents in some sections and under most favorable conditions, a cost of ¼ cent to ⅓ cent per BHP/Hour may be obtained.

It is stated that no skilled mechanic is required to start the engine and no attendance is required once starting is accomplished and proper supplies of fuel oil, lubricating oil and cooling water provided. The governor automatically adjusts the supply of fuel to the load.



BENZ OIL ENGINE

NEW PLATING BARREL

A new plating barrel has been placed on the market by the Automatic Inside Anodes Barrel Manufacturing Company of Chicago, Ill. This barrel is one of the few with the anodes inside; it is also designed for automatic discharging. Among the advantages claimed are the following:

It can be used for a greater range of work than other devices.

It has a large opening space for the inside anodes, which rest on the tub and its electrical contacts.

All the current flows directly through the work and does not sideswipe it; equipped with a cathode rod dangler.

Its self-inflowing solution within this plating cylinder keeps it from becoming impoverished.

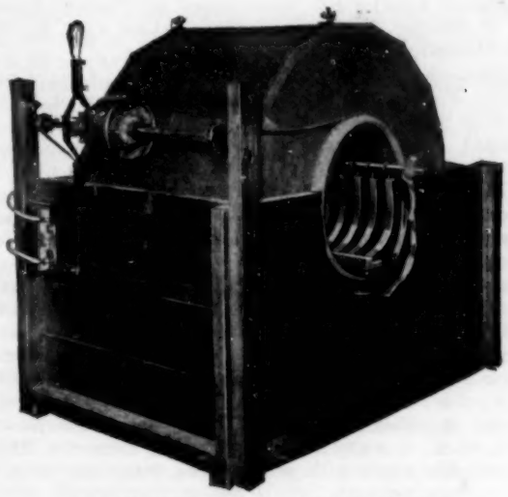
Is simple to operate and you can keep a close watch on the work and take out samples for inspection, without stopping this machine.

If the goods-slider is in position, by one turn only, all the work slides automatically in and is ready for rinsing.

All work plated in this barrel gets a preliminary polish.

The barrel and also the electric current is started and stopped by throwing in and out the same clutch lever.

These machines are built of the best materials and any size can be made of self-emptying barrels for rinsing, drying, etc.; also with perforated panel for outside anodes.



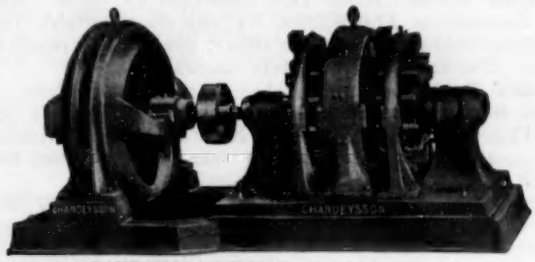
AUTOMATIC INSIDE ANODES BARREL

MOTOR GENERATOR SET

The Chandeysson Electric Company, St. Louis, Mo., is putting on the market several types of motor generator sets of particular interest to the plating industries. Among these is the one illustrated below with the generator for 6,000-3,000 amperes and 6 to 12 volts, 360 R. P. M. The motor is 60 H.P., 3 phase, 60 cycle, 440 volts.

For this unit the generator is the type P, 2,000 to 10,000 ampere, double commutator split type. The motor can be alternating current or direct current, and if alternating, can be furnished in either 2 or 3 phase squirrel cage type with wound rotor or slip rings. Special motors can be furnished of other manufacture if desired.

Standard units are provided with heavy reinforced one-piece cast iron base, accurately machined. Some types of large special units are provided with two-piece split base. The method of construction in the case of the larger unit, permits of greater flexibility in installation, transportation, handling, etc., as well as adding extra mechanical strength. The company recommends the purchase of very large units without base and with motor and generator mounted direct on concrete foundation. Large and heavy flexible couplings of the rubber brass, and special fibre bushed multiple stud type, of the company's own manufacture, are used. The manufacturers are prepared to furnish any type of starting or regulating equipment for either A. C. or D. C. motors. All standard Chandeysson apparatus, unless otherwise specified, is rated on the 40° Electric Power Club standard basis, covering standard open-type machines. The apparatus, unless otherwise specified, is absolutely guaranteed against electrical and mechanical defects as set forth in the "Standards of the Electric Power Club."



CHANDEYSSON MOTOR GENERATOR SET

EQUIPMENT AND SUPPLIES CATALOGS

Iron Filler or Cement—A folder on Stevens Stopper—Iron filler or cement for castings, has been issued by Frederic B. Stevens, Detroit, Mich.

Rheostats—Bulletin No. 104, covering the various types of Crown rheostats, and including a price list. Crown Rheostat & Supply Company, Chicago, Ill.

Foundry and Electro-Plating Supplies and Equipment—A folder has been issued by Frederic B. Stevens, Detroit, Mich., listing the products sold by that company

Coal Meters—Bulletin CM-27, describing and illustrating the measurement of coal with Republic Coal Meters. Issued by Republic Flow Meters Company, Chicago, Ill.

Electroplating and Polishing Equipment and Supplies—A reference list has been put out by Daniels & Orben Company, Inc., New York City, on Doco brand supplies.

"Better Foundry Practice"—Booklet No. 6 covering Production Equipment, prepared by the Policyholders' Service Bureau, Metropolitan Life Insurance Company, New York.

Flexible Shaft Machines—A folder has been issued by N. A. Strand & Company, Chicago, Ill., on its portable flexible shaft machines for grinding, polishing, buffing, scratch brushing, drilling, etc.

Slate and Marble Drill—Bulletin 3018-S describes the new Hisey electric slate and marble drill, which is also adapted for some glass drilling operations, made by the Hisey-Wolf Machine Company, Cincinnati, Ohio.

Pattern Metal—A folder has been issued by Frederic B. Stevens, Detroit, Mich., on Aluminus—an aluminum alloy made especially for pattern and match-plate work, where a pure, clean and thoroughly dependable metal is required.

Furnace Lining—The Keystone Refractories Company, Inc., 120 Liberty street, New York, N. Y., has issued a booklet describing how lower maintenance costs or refractory linings are obtained with Dura-Stix in various types of furnaces, including the Ajax electric.

Heating Exhibit—A folder has been issued by Warren Webster & Company, Camden, N. J., describing a heating exhibit of unusual interest at the Power Show; also two papers discussing the important heating system design problems of "lifts" and "runouts."

Sand Blast and Foundry Equipment—A booklet, attractively bound and well illustrated, has been issued by the New Haven Sand Blast Company, New Haven, Conn., containing the following chapters: the New Haven Self-Contained Conical Gravity Barrel; the New Haven Self-Contained Sand Blast Barrel —Model A; New Haven Self-Contained Direct Pressure Sand Blast Barrel; the New Haven Sand Blast Room; the New Haven Automatic Direct Pressure Sand Blast Tank Machine; the New Haven Dust Arrestor; the New Haven Sand Blast Cabinet Suction System; the New Haven Portable Injector Sand Blast Gun; Some Well Known Plants Using New Haven Sand Blast.

Rust Prevention—A booklet describing Vatu, a rust preventive made by the American Rust Proof Company, New York City.

Pumice—A booklet has been issued on Pumice Stone by James H. Rhodes & Company, Long Island City, N. Y. It is well illustrated.

Crucibles—A circular has been issued by Lava Crucible Company, Pittsburgh, Pa., showing advantages of crucibles for melting metals.

Precision Cold Mills—The Blake & Johnson Company, Waterbury, Conn., has issued a folder on Precision Cold Mills—double-reduction type.

Ribbon Metal Four Slide Machine—The Baird Machine Company, Bridgeport, Conn., has issued an illustrated folder on Baird No. 3 Ribbon Metal Four Slide Machine.

"Cross-Word Puzzle"—The Hilo Varnish Corporation, Brooklyn, N. Y., has sent out a sheet containing a Hilo Cross-Word Puzzle, with prizes offered for the correct solution.

Electric CO_2 Meter—Catalog No. 32, showing the advantages of measuring CO_2 electrically. This catalog is well illustrated. Issued by the Brown Instrument Company, Philadelphia, Pa.

"Electric Equipment for Cranes"—A General Electric Bulletin, No. 48732, recently issued. This is an attractive, 35-page leaflet, well illustrated with photographs, diagrams, tables and charts.

Used Electrical Equipment—Bulletin 28 has been issued by Fuerst-Friedman Company, East 53rd street at Hamilton avenue, Cleveland, Ohio, on used electrical equipment sold by this company.

Merchants' Association Year Book—1924 Year Book of the Merchants' Association of New York, showing its activities and the value of this association to New York City, and to the country in general.

Bridgeport Ledrite Rod-O-Graph.—A chart issued by the Bridgeport Brass Company, Bridgeport, Conn., for quickly determining the weight in pounds per thousand pieces of Bridgeport Ledrite brass rod.

Portable Tools—Catalog 1920, published by H. B. Underwood Corporation, Philadelphia, Pa., describes Portable Tools for railway repair and machine shops; power plant repair engineers. The catalog is profusely illustrated.

Rhodes' Products—A folder has been issued by James H. Rhodes & Company, Long Island City, N. Y., giving a complete line of Rhodes' products, such as sponges, chamois, cleaners, steel wool, felts and cut felts, pumice stone, buffs and felt wheels, emery, rouge, etc.

Transmission Machinery—Catalog No. 31, covering shaft hangers, pillow blocks, couplings, collars, belt tighteners, etc., the latest data on a completely rounded outline of quality transmission appliances, has been issued by W. A. Jones, Foundry & Machine Company, Chicago.

Electric Hoists—An illustrated descriptive price-list and catalog issued by the Shepard Electric Crane & Hoist Company, Montour Falls, N. Y., covering floor operated electric hoists. The book is attractively put up, profusely illustrated and contains a great deal of valuable information.

Conveyor Equipment—Catalog No. 32, covering a full line of sprocket wheels and chain belting as well as chain tighteners, elevator boots, etc., illustrations, listing prices and complete specifications on all items shown, has been issued by W. A. Jones, Foundry & Machine Company, Chicago.

Cloth Screen Dust Collector—A folder published by the J. W. Paxson Company, Philadelphia, Pa., illustrating and describing a practical device for improving sanitary conditions and the working efficiency in any plant handling dry granular materials by removing 98 per cent of the fine powder and dust in the air.

Commerce Department Year Book—1924 edition of the Year Book of the Department of Commerce. It reviews the broad economic currents developed during the year, and aims at the systematic consolidation of statistics as to production, distribution, prices and markets for American commodities over a long term of years.

Better Foundry Practice—Policyholders' Service Bureau of the Metropolitan Life Insurance Company of New York has issued the following booklets on Better Foundry Practice: No. 1, The Building; No. 2, The Organization; No. 3, Getting Castings Out on Schedule; No. 4, Pattern Storage; No. 5, Maintenance and Flask Storage. These booklets are well illustrated and extremely instructive.

CALENDARS

A number of attractively designed and illustrated calendars have been received by us from the following companies, among others:

Anaconda Company, New York. Date Pad for American Brass Calendar.

J. W. Paxson Company, Philadelphia, Pa.

Standard Rolling Mills, Inc., Brooklyn, N. Y.

General Electric Company, Schenectady, N. Y.,—a calendar with extraordinarily fine illustrations reproduced from paintings by W. L. Greene. These pictures represent installations of large electrical equipment covering all phases, including railroads, water power developments, lumbering machinery, transmission lines, lighting systems, factory equipment, urban transportation, and marine installations.

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

Progress in 1924—Plans for 1925

AMERICAN FOUNDRYMEN'S ASSOCIATION

HEADQUARTERS, 140 S. DEARBORN ST., CHICAGO, ILL.

HONORARY MEMBERSHIP FOR PAST PRESIDENT G. H. CLAMER

President Clamer, in delivering the president's annual address at the Milwaukee meeting in October, 1924, emphasized the objects of the association which were stated to be:

1. To conduct research activities which were too extensive or too costly for any except the large organization.
2. To act as a clearing house for foundry information and the advanced ideas of practical foundrymen.
3. To act as a proper representative in matters of industrial relations affecting the industry.
4. To sponsor foundrymen's conventions and exhibitis and other meetings of foundrymen having the betterment of the industry as an objective.

Other points mentioned in his address were the work of foreign national foundrymen's organizations, the policy of the American Foundrymen's Association for its future work, cooperative research, the increasing extent of committee activities and the institution of awards.

The increasing variety of demands made on the association to participate in many activities was stated by the president as necessitating a clarification of the policy which the association should follow in the future and a special committee on policy was appointed at the Milwaukee meeting to report to the Board of Directors at its meeting in November, 1924.

President Clamer stressed the need for cooperative organization in fields of research, pointing out as an example of what can be done, the results achieved by the work of the Joint Molding Sand Research Committee. Other examples cited were those of the American Malleable Casting Association research projects and the work of the Electric Steel Founder's Research Group.

The value of the American Foundrymen's Association as an association was emphasized in the light of the increasing activities of the technical committees, President Clamer point-

ing to the valuable contributions contained in the thirteen committee reports presented at this meeting as indicating the importance of such work to the industry.

Following the precedent set in previous years, Mr. Clamer as the retiring president was elected an honorary member of the American Foundrymen's Association at the business meeting of the convention.

Nothing definite yet in regard to the next annual convention, except the Board of Directors having gone on record as being unanimously in favor of some eastern city and a meeting in the fall.

A special committee has been appointed with authority to name the time and place. They are now gathering information regarding the advantages and conditions in several cities along the Atlantic seaboard and in New England.

INSTITUTE OF METALS DIVISION

HEADQUARTERS, 29 W. 39TH STREET, NEW YORK

The Institute of Metals Division has held two meetings during the year, one with the American Institute of Mining and Metallurgical Engineers in New York in February, at which time Dr. Jeffries gave the annual lecture before the division. The other meeting was held in connection with the American Foundrymen's Association in Milwaukee in October and also had a very good program.

It is planned to hold a special membership drive for new business next year and to increase greatly the interest in membership in the division.

The outstanding event for 1925 is the annual lecture before the division by Dr. Carl Benedicks, director of the Metallographic Institute, Stockholm, Sweden. He will discuss some phases of corrosion problems, with particular reference to the effect of hotwall action and corrosion on pitting. Dr. Benedicks will also deliver lectures at several universities in the United States and will be in this country from about February 9 to April 13.

SOCIETY FOR TESTING MATERIALS

HEADQUARTERS, 1315 SPRUCE STREET, PHILADELPHIA, PA.

The Executive Committee announces that the Annual Meeting in 1925 will be held at Chalfonte-Haddon Hall, Atlantic City, N. J., June 22-26.

Committee B-2 on Non-Ferrous Metals and Alloys expects to present a report on antimony at the next annual meeting, in June, 1925. The Sub-Committee on Chemical Analysis is carrying out some cooperative analytical work on samples representing commercially pure aluminum, 99 per cent grade, aluminum alloy similar to Specifications No. 33 of the Society of Automotive Engineers and aluminum alloy of the duralumin type. Two additional methods for the analysis of aluminum in brass and bronze have recently been studied. It may be that this will result in the revision of the present Methods of Chemical Analysis of Brass and Bronze.

The specifications for aluminum ingots were discussed, with the result that the present Specifications for Aluminum Ingots for Remelting and for Rolling may be completely rewritten.

The Sub-Committee on Fluxes and Deoxidizers reported that it was at present engaged in digesting the material assembled at the round table discussion of the American Institute of Mining and Metallurgical Engineers held last February. Based upon this information it expects to draw up a list of specifications and alloys giving types of composition, properties and fields of usefulness.

Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys gave further consideration to the details to be followed in the co-operative tests which it is now inaugurating, such details relating to method of preparing specimens, method of determining depth of pitting, etc. The Sub-Committees on Total Immersion Tests, on Alternate Immersion Tests and on Accelerated Electrolytic Corrosion Tests reported that they were prepared to proceed immediately in carrying out the tests upon receipt of samples. Some of the samples are now ready and it is expected that all samples will be ready for distribution in about a month.

BRASS MANUFACTURERS

HEADQUARTERS, CITY HALL SQUARE BUILDING, CHICAGO, ILL.

The National Association of Brass Manufacturers held its Annual Meeting at the Hotel Astor, on December 11th, with nearly a 90 per cent attendance.

A standing committee of five on Research Work was appointed, the purpose of which is to make surveys and look into the most modern method of foundry practices and other equipment for the practical and efficient production of brass goods.

Under the new provision of the Constitution providing for an Associate Membership, the following firms were elected: Rome Manufacturing Company, Rome, N. Y.; Michigan Smelting & Refining Company, Detroit, Mich.; The Loewenthal Company, Chicago, Ill.; White & Bros., Inc., Philadelphia, Pa.; Titan Metal Company, Bellfonte, Pa.; The Nassau Smelting & Refining Works, Ltd., New York, N. Y.; Alliance Vitreous China Company, Alliance, Ohio; Karl Hutter, Inc., New York, N. Y.

As the trend of time seems to favor shorter terms, it was decided to recommend a change from sixty (60) days to thirty (30) days net, with the usual cash discount.

The association went on record as strongly opposing the Twentieth Amendment to the United States Constitution on the matter of Child-Labor.

Reports of the Standardization Committee, Water Works Division of the Standardization Committee and Committee on Elimination were received.

A survey was made at a later session of the profits made by various members, which proved most illuminating.

Commissioner Webster's report showed the finances of the association sound and in a strong condition.

The following officers were elected: President, H. F. Albers, Ohio; first vice-president, R. L. Ottke, Pennsylvania; second vice-president, H. C. Bulkley, Illinois; board of trustees, C. J. Hill, Massachusetts; D. M. Hamilton, Michigan; L. D. Lawnin, Missouri; Jos. Arth, Jr., Ohio; Geo. Van Eweyk, Jr., Wisconsin, and H. E. Harper, Wisconsin.

The meeting adjourned to meet in the United States Chamber of Commerce Building, Washington, D. C., March 11-12, 1925.

AMERICAN ELECTRO PLATERS' SOCIETY

HEADQUARTERS, CARE OF E. J. MUSICK, 7144 KINGSBURY BOULEVARD, ST. LOUIS, MO.

A Report by E. J. MUSICK, Supreme Secretary-Treasurer

The American Electro Platers' Society with the ending of the year 1924 finds itself stronger in membership, stronger in the stability of its 23 local branches and stronger in its ideals and desires to acquire more knowledge relating to electroplating, and stronger by reason of the universal belief amongst its members that cooperation, not only with its own members, but also with the United States Bureau of Standards along a definite line of research is the essential step toward making real progress in knowing the whys and wherefores of electroplating.

The membership has shown a steady increase without exception each year, until we have a membership at present of 1035, which includes many prominent business men who have been foreman platers in the past, prominent electro-chemists and quite a few professors of electro-chemistry on the faculties of the leading universities.

The officers of the local branches have, in most cases, reduced the time allotted for routine business and increased the time for the educational discussions at their regular meetings. These discussions are always worth while and are very helpful to those present.

There has been several joint conferences between the Electro-plating Division of the Bureau of Standards and the American Electro-platers' Society Research Committee and others interested, but the most noteworthy was the recent one held at the Bureau in Washington on November 14 and 15, 1924. The details of this conference were described fully in the December issue of THE METAL INDUSTRY, beginning on page 489.

There has been much discussion as to the best way to co-

operate with the United States Bureau of Standards, and at the next Annual Convention to be held about July 1, 1925, in Montreal, Canada, no doubt a plan will be decided upon to raise a general Research Fund.

It is my personal opinion it is possible that this General Research Fund might be of sufficient size to maintain an electro-plater in the United States Bureau of Standards through the year, whose entire time would be devoted to our problems under the direction and supervision of the Bureau of Standards and the Research Committee of the American Electro-platers' Society.

The wonderful success of the 1924 convention, held in Milwaukee, is now past history, and all eyes are now turned toward the Montreal, 1925, convention, where this important question will be one of the things to be decided. Shall we go forward or stand still? Mr. Manufacturer, your alertness to the good management of your business is challenged, if you fail to send your foreman-plater to Montreal next year.

CLEVELAND BRANCH

HEADQUARTERS, c/o H. S. KNEELAND, 3924 CLYBOURNE AVENUE

The Cleveland Branch held its first open meeting, (that is, open to foremen-platers who can qualify to become members). The meeting was a grand success, being the largest and most interesting in the history of the Branch. It was decided to have another open meeting January 3, 1925, at the Hotel Winton at 8 P. M.

The Cleveland Branch is very active and every plater in the district should take advantage of their question box and their experiments. They are getting wonderful results in our membership drive. Anyone wishing an application or information may write to the secretary and he will be glad to send it.

NEW YORK BRANCH

HEADQUARTERS, CARE OF J. E. STERLING, 468 GRAND AVENUE, LONG ISLAND CITY, NEW YORK

In December, two meetings were held; on the 12th and 22nd. The first meeting was devoted to Business and Good and Welfare. At the second, C. H. Buchanan lectured on Nickel Anodes in his usual interesting manner.

President Fischer presided at the December meetings of the New York Branch. H. Ruhlman, J. Halas and J. C. Boyer were elected active members. A committee was appointed for the coming banquet consisting of the following members: J. Minges, chairman, T. B. Haddow, B. Popper, P. Morningstar, W. Schnider, H. C. Flanagan, D. Downs, J. Burke, S. Schubert.

The Banquet and Founder's will be held on Saturday, February 21, 1925, at the Aldine Club, 200 Fifth avenue, New York, N. Y.

T. B. Haddow read an interesting paper in which he gave a Historical Review of Lacquers and Their Uses. C. H. Proctor spoke on some very interesting plating problems he came in contact with while on his travels throughout the country.

The following plating problems were discussed at length: The Preparation of Aluminum Die Castings and Zinc Sheet for Electro Plating; Decorating Tin; Protecting Silverware from Tarnishing During Transportation.

PROVIDENCE-ATTLEBORO BRANCH

HEADQUARTERS, CARE OF R. F. CROOK, 25 DEAN STREET, PROVIDENCE, R. I.

The seventh annual banquet of the Providence-Attleboro branch, American Electro-Platers Society, will be held at the Narragansett Hotel, Providence, R. I., Saturday, January 24, 1925. It is the plan of the committee to have an afternoon educational and discussion period at three o'clock in the parlors of the Narragansett Hotel on the mezzanine floor, with the best speakers on hand that is possible to obtain. It is also planned to have a complimentary program in the hands of every one at the afternoon session as well as at the banquet.

PLATING SALESMEN'S ASSOCIATION

HEADQUARTERS, CARE OF JOHN C. OBERENDER, CELLULOID ZAPON COMPANY, 185 CHURCH STREET, NEW HAVEN, CONN.

The temporary organization affected in Milwaukee last July is functioning in a most broad and thorough-going way. They are getting assistance from similar bodies who have become internationally successful.

A circular letter will soon be sent out to all men whose names are obtainable, inviting them to join in the formation of an association for the best mutual interests of men engaged in selling to the plating craft. The next meeting will be held at Montreal next year, previous to the international convention of the A. E. S.

The officers chosen at the temporary meeting held last July, at Milwaukee, are as follows: Temporary chairman, Wilfred S. McKeon, Liquid Sulphur Building, Greensburg, Pa.; temporary secretary, John C. Oberender, manager, Celluloid Zapon Company, Chamber of Commerce Building, 185 Church St., New Haven, Conn.

AMERICAN ELECTROCHEMICAL SOCIETY

HEADQUARTERS, COLUMBIA UNIVERSITY, NEW YORK

The American Electrochemical Society held two very successful meetings during 1924. The Spring Meeting took place at Philadelphia and the outstanding features of this meeting were the two symposia, one on "Organic Electrochemistry," and the other on "Recent Progress in Electrodeposition." In almost all of the metal electrodeposition baths used today, especially in those used on a large commercial scale, there are organic chemical compounds added, usually called addition agents. The most common of these is glue or gelatin, but there are a large number of others which have also been found very efficient in bringing about smooth deposits of copper, tin, nickel, zinc, etc., of thickness as much as ½".

The symposium on "Recent Progress in Electrodeposition" was in charge of S. Skowronski, research chemist of the Raritan Copper Works of the Anaconda Copper Company. It was the first time in the history of electrometallurgy that so large an attendance of members and guests occurred, all of them vitally interested in the electrolytic refining and the electroplating of metals. Electrolytic tin, which only a few years ago was ridiculed as a mere laboratory stunt, was definitely shown to be a commercial product.

Another session of the Philadelphia meeting which is well worth recalling is the Round Table discussion on "Refractories." The refractory problem is very serious, especially when it comes to refractories that are to withstand temperatures above 2000° C.

The Fall Meeting of the society took place at Detroit and was devoted in particular to that phase of the chemical and electrical industries in which the automobile manufacturers were especially interested. In Detrait there has been a very rapid expansion in the application of electric ovens and electric furnaces for various purposes. Many of the automobile factories today employ electric furnaces for heat treating and for baking of the enamel, and the society decided to devote an entire session to "Industrial Electric Heating."

A morning and an afternoon session were devoted to the Corrosion of Metals, presided over by Dr. Saklatwalla, of the Vanadium Corporation of America, recently the recipient of the Grasselli Medal for his corrosion research. Among the things brought to light at this symposium was that our standard methods of testing were not entirely reliable; that, for example, the salt spray tset was very often misleading. Most of the discussion centered around the chrome alloys, such as stainless and rustless iron and also those with higher percentages of chromium. Chromium as a metal, and also as a constituent in alloys, has come forward as one of the most important metals of the day and the near future.

Round Table discussion was in charge of Prof. O. P. Watts and dealt with the "Control Methods in Electrodeposition." The two metals mainly discussed were nickel and brass. There has been considerable activity in nickel plating within the past year and we are looking forward to some striking developments in the very near future.

As to the coming year, 1925, the society has planned two meetings. The Spring Meeting is to be held at Niagara Falls

and the main session will be devoted to the production of metals by the Fused Electrolyte Process. This will include the metals aluminum, magnesium, sodium, calcium, caesium, beryllium, cerium, etc., mostly metals of low specific gravity and therefore of great importance in the construction of aeroplanes. The Round Table discussion will be devoted to the "Teaching of Electrochemistry."

The 1925 Fall Meeting will be held at Chattanooga, Tenn. The meeting will be devoted primarily to a discussion on the very broad subject, "The Relation of Electrochemistry to the Fertilizer Industry." Under this broad heading are included the fixation of atmospheric nitrogen, the production of phosphoric acid in the electric furnace, the electrolytic production of hydrogen used in the synthesis of ammonia, the production of calcium cyanamide in the electric furnace, etc.

ENGINEERING STANDARDS COMMITTEE

HEADQUARTERS, 29 W. 39TH STREET, NEW YORK

At the annual meeting of the American Engineering Standards Committee, on December 11, Charles E. Skinner, a representative of the American Institute of Electrical Engineers, was elected chairman for the year 1925, and Charles Rufus Harte, representative of the American Electric Railway Association, was elected vice-chairman. Among the other members of the executive committee for the year 1925 are Geo. K. Burgess, U. S. Department of Commerce, and John A. Capp, American Society for Testing Materials.

DEVELOPMENTS IN INDUSTRIAL STANDARDIZATION DURING 1924

Notable developments in the industrial standardization movement, including important progress in the mechanical and mining industries, and in the safety field, its further extension into managerial and trade association activities, both here and in Europe, and steps looking toward it in Latin America have taken place during 1924. One hundred and fifty trade associations are officially participating in the work through accredited representatives.

In all, about 70 standards have been approved by the American Engineering Standards Committee, and 100 others are under way. Of these, 32 have to do with civil engineering, and the building trades; 26 with mechanical engineering; 15 with electrical engineering; 4 with automotive subjects; 11 with transport; 1 with ships and their machinery; 14 with ferrous metals; 15 with non-ferrous metals; 12 with chemical subjects; 2 with textiles; 16 with mining; 5 with the wood industry; 1 with the paper and pulp industry; and 11 projects with topics of a miscellaneous or general character.

The most important piece of work completed by the A. E. S. C. in the mechanical field during 1924 was the promulgation of the standard for screw threads, a subject which touches practically every industry. Good progress has been made in two other far-reaching subjects, gages and systems of gaging, and pipe flanges and fittings. Parts of the work on both of these subjects are now nearly ready and will be issued soon.

The Federal Specifications Board has now adopted nearly 300 specifications. These are used as a basis of purchase throughout the Federal government. The A. E. S. C. has continued its co-operation in this work, and during the year has circulated more than 100 of these specifications for criticism, in order to determine their acceptability in industry before official adoption by the government.

The third year of the work of Mr. Hoover's Division of Simplified Practice has shown extensive development. In all, 26 simplifications have already been carried through, 10 others are in the final stages, and 45 additional surveys are now under way. Two hundred industrial groups are co-operating in the various projects. The U. S. Chamber of Commerce and the A. E. S. C. are co-operating closely in this work.

INSTITUTE OF THE CITY OF NEW YORK

HEADQUARTERS, 47 W. 34TH STREET, NEW YORK

The American Institute of the City of New York, now beginning its ninety-seventh year of continuous effort for American industry, announces through its Board of Trustees an activities program for 1925 that covers a wide range of work in the interest of the public. Many of the important problems of American industry, including Government control of radio and the management of the Patent Office, are scheduled for investigation by committees of experts appointed by the institute. Partly in connection with this work, there will be public lectures and open forums for the purpose of informing the public concerning present-day industrial needs and abuses.

As a feature of its work in the interest of inventors and inventions the American Institute will hold an Exposition of Inventions next Spring at the Engineering Societys' Building in New York. This is designed to afford inventors and companies owning or having developed inventions the opportunity of showing their achievements to the public; and to afford the public the opportunity of seeing and studying the current work of inventors. The opportunities the exposition offers are of interest to both individual inventors and industrial and commercial companies.

To make this service for invention continuous the institute undertakes to act as a clearing house for information about inventions and related matters. The members of the institute who are interested in invention and industrial development are further provided for by meetings at which individual problems and recent happenings are discussed.

Personals

WILLIAM H. BASSETT*

William H. Bassett, technical superintendent and metallurgist of the American Brass Company, has been awarded the James Douglas Gold Medal for 1925 of the American Institute of Mining and Metallurgical Engineer, "for constructive research in copper and brass and other non-ferrous metals and their alloys, and his contributions to the establishment of the present accepted high standards of quality."

Mr. Bassett was born in New Bedford, Mass., on March 7, 1868, and was graduated in chemistry at the Massachusetts Institute of Technology in 1891. In the same year he went to Pope's Island Manufacturing Company, at New Bedford, as chemist where he remained until 1895, where he became a teacher in chemistry at the Swain Free School, which position he retained until 1900. He then became chemist for the New Jersey Zinc Company, at Newark, N. J., and in 1902 went to the Coe Brass branch at Torrington, Conn., as chemist. In 1903 he became chief chemist and metallurgist and since 1912 has been technical superintendent and metallurgist of the American Brass Company, with headquarters at Waterbury, Conn.

*From the announcement in Mining and Metallurgy, December, 1924.

WILLIAM H. BASSETT

Underwood & Underwood Studios, N. Y.

He is a member of the following societies: Fellow of American Association for the Advancement of Science; American Institute of Mining and Metallurgical Engineers, Society of Automotive Engineers, American Society for Testing Materials, American Institute of Chemical Engineers, American Chemical Society, American Society of Mechanical Engineers, National Research Council, Institute of Metals (British), Society of Chemical Industry (British).

Mr. Bassett was the pioneer metallurgist of the brass industry, and as such probably has done more to place the industry on its present scientific basis than any living man. He is largely responsible for the present high quality of refined copper, and he did much work in bringing about the high quality of zinc supplied for making brass and other alloys. He was the first to apply the spectroscope to routine work in the non-efrrous metal industry and first to apply the microscope to the metallography of non-ferrous metals. He commenced work on this subject in 1902 and developed methods for the microscopic examination of copper and copper alloys, and the relations between the crystal size, heat treatment and physical properties, and the application of metallography to manufacturing control.

Original work has been done by Mr. Bassett along the following lines:

Standardization of methods of chemical analysis of copper and its alloys.

Improvement of condenser tubes and methods of manufacturing them.

"Season cracking" of brass, and the development of methods of control in the manufacture of brass tubes, rods, and shapes so that this trouble does not occur.

Elimination of wastes in the manufacture of brass, both in process of manufacture, and recovery of waste materials.

The application of laboratory control to manufacturing methods.

Preparation of standard specifications for non-ferrous metals, their alloys, and products from same.

Mr. Bassett has been the author of many technical papers and his ideas and general policies have been extensively reflected through the many engineering and scientific committees of which he is or has been a member. At the present time he is a member of several boards and committees, acting in an advisory capacity to several of the governing departments. In 1917 he was appointed, by the International Aircraft Standards Board, to represent this country in a conference in London, but owing to the situation in this country at that time the American Brass Company did not feel that his services could be spared.

His principal interest has been in metallography and its application to manufacturing control. Although his greatest work has been accomplished in copper and brass, in regard to which he is an international authority, he has done hardly less notable work in other non-ferrous metals and alloys.

E. V. Peters, general sales manager of the New Jersey Zinc Sales Company, New York, returned from Europe December 10. While abroad he visited England, Holland, Germany, France and Belgium.

Charles Kachel has retired from the sheet metal stamping business and will make his home in Miami, Fla. He was superintendent of the Bossert Corporation, Utica, N. Y., for fourteen years. Mr. Kachel expects to organize a sales organization in Miami.

C. B. Starr has joined the Robert June Engineering Management Organization of 8835 Linwood avenue, Detroit, Mich. Mr. Starr is a graduate of Cornell University with the Degree of M. E. He was assistant mechanical engineer with the Duff Manufacturing Company of Pittsburgh, Pa., and later served in the capacity of sales engineer with the Detroit office of the Wayne Tank & Pump Company.

A. L. Haasis of Joseph Dixon Crucible Company, Jersey City, N. J., in one of his unique New Year's letters, advises us that " all the financial big wigs are agreed that 1925 is to be the wonder of wonder years in a business way. Let her come! I guess we can all stand it. Blessings upon you for the New Year, and a chance to do as you jolly well please. Now with this off my chest, I am going to be yours most assuredly."

W. M. Corse has become associated with the Research Service, Investment Building, Washington, D. C., as vice-president and general manager. He is still doing metallurgical work for the International Nickel Company and is secretary of the Board of Trustees of the International Critical Tables of Chemical and Physical Data at the National Research Council; also chairman of the Corrosion Committee of that Council. A description of the work of the Research Service will be found in the equipment columns of this issue.

Uri T. Hungerford, chairman of the board of directors and founder of the U. T. Hungerford Brass & Copper Company, New York, celebrated his 83rd birthday on December 14th. In honor of this event the stockholders of the company, together with a few invited guests, gave a luncheon to Mr. Hungerford on December 18th at the Hardware Club. At eighty-three he is as vigorous and keenly interested in his extensive and varied business affairs as is the average man tenty years his junior. In THE METAL INDUSTRY for January, 1922, we published a sketch of his career.

John E. Sterling, past president of the American Electro-Platers' Society, reports that **Mrs. Sterling,** who was badly injured on June 26, 1924, has been out of the hospital for about three months and is improving wonderfully considering the extent of her injuries.

She was injured while riding on one of the large sight-seeing automobiles, loaded with women and children from a dancing school, attended by her little daughter. While Mrs. Sterling was badly hurt, and it is a question whether she will ever gain the full use of her arm again, all her friends will be happy to know that she is doing very well under the circumstances and it is hoped that she will be able to attend next year's convention at Montreal.

Obituary

EUGENE A. EDDY

Eugene A. Eddy died recently at the Jane Brown Memorial Hospital, Providence, R. I. Mr. Eddy was owner of the Eddy Machine Company of Providence.

JOHN F. BRAYER

John F. Brayer, chairman of the board of directors of the Co-operative Foundry Company, died suddenly at his home, Rochester, N. Y., on Saturday, December 20th. Mr. Brayer was born in 1852, and spent his lifetime in Rochester. He engaged in the stove-making business when 16 years old, being employed in the jobbing shop of a retail store. When 21 years old he established the first sheet-metal department in the Co-operative Foundry Company, and his rise to a directorship resulted. He was first to apply nickel-plating to stoves made in Rochester, as well as ornamental work that required the use of bronze and brass.

THOMAS B. WALKER

Thomas B. Walker, 85 years of age, of Highland avenue, Waterbury, Conn., passed away December 1, 1924. He was connected with the brass industry all his life and when he retired some years ago, after 41 years' service with Holmes, Booth & Hayden, he was general superintendent there. This plant is now one of the parts of the American Brass Company.

He was born near Edinburgh, Scotland, August 12, 1839, and came to Waterbury, Conn., at the age of 25, entering the brass industry, and later becoming superintendent of the plant

mentioned. He married Jane Smith Inglis of Melrose, Scotland, July 14, 1865. For years he has been a prominent member of the Third Congregational Church and of the Masonic fraternity. His first wife died June 14, 1884. His second wife, who was Miss Margaret Bissett Kirk, survives him. Three of his children are deceased, Isabella C. Walker, William C. Walker and George B. Walker. Two survive, Thomas I. Walker and Mrs. Agnes Morgan.

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

NEW ENGLAND STATES

WATERBURY, CONN.

JANUARY 5, 1925.

Business in Waterbury brass plants and related industries cannot be said to have been dull during the past year with the exception of a few months in the summer. In the early part of the year business was good with most of the plants running on full time. Gradually a little slackness made itself manifest as summer came on until in the middle of the summer practically all the shops were running at about 75 per cent of their normal activity.

This condition gradually improved before election time so that by November most of the plants were practically on the same basis as early spring. Since the election there has been quite a rapid improvement considering the short space of time, and indications are that the improvement will be more noticeable within a few months after the first of the year. Present indications are that business will be on the increase rather than on the decline throughout most of the coming year.

The industrial employment survey of the **Department of Labor** says of Waterbury:

"All plants are operating full time and in some departments overtime prevails and the supply of labor here about equals the demand. Extensive building operations afford employment to about 500 tradesmen. Industrial employment conditions have shown an upward trend during the month."

Since the statements made, last month, by the heads of the industries involved that such negotiations as had been held relative to a possible merger of the **Scovill Manufacturing Company** and the **Chase Companies,** Waterbury, with other concerns "had not revealed that such a merger at the present time was either practical or expedient," no further light has been thrown on the ever-present rumors of possible brass mergers. A local newspaper report to the effect that the only difficulty holding up the prospective merger between the two concerns named and other smaller brass concerns throughout the East and Middle West was the matter of name brought no further comment from the heads of the two local industries. The report referred to was to the effect that the Chase interests would not agree to any merger which would mean the obliteration of the Chase name in the brass world, feeling that the name was so linked with the manufacture of brass that it would be unthinkable to discard it. In this connection, it may be remembered that **F. S. Chase,** president of the Chase companies, discussing the possibility of a merger, last month, said:

"Should the time ever come when it might seem feasible and desirable . . . we should have in mind the conservation of certain ideals always associated with our business and expect our company to retain its identity and relative importance in the brass business."

Neither he nor **E. O. Goss,** president of the Scovill Manufacturing Company would make any comment on the report referred to, merely stating that they had said all they had to say on the matter last month.

W. J. Larkin, for 45 years in the employ of the **Waterbury Clock Company,** has resigned as vice-president of the concern. Until the past year he has also been superintendent of the company, but he resigned this position about a year ago and **Charles Granger** was appointed to it. He entered the company's employ in a minor position when scarcely 20 years old and gradually worked his way up to be assistant foreman and then foreman of a department and finally assistant superintendent and superintendent of the entire plant. He has been superintendent of the clock company for the past 20 years and its vice-president for the past 10 years.

Mr. Larkin played an active part in the development of the plant, particularly in its recent acquisition of the entire **Ingersoll** Watch Company, including the old New England Watch Company plant in this city and the Ingersoll plant in Trenton. He has always been active in political and civic affairs. It is not known who will fill his place as vice-president, although it is considered probable that Superintendent Charles Granger will be the man. The election will take place the latter part of January.

Announcement has been made by the Chase companies that **Sherman Perry,** for many years president of **Perry's, Inc.,** will become associated with them on January 1st. It cannot be learned at this time just what Mr. Perry's duties will be. While giving all his time to the activities of the Chase companies, he will retain his interest in Perry's, Inc. **Harrison H. Camp,** who has been assistant manager of Perry's for several years, will become active manager of the concern. Mr. Perry is a son-in-law of **Gov. C. A. Templeton.** He was one of the chief workers in putting on the industrial exposition here last summer.

Ellsworth D. Goldsmith, for several years a salesman for the Bristol Brass Company, has been appointed by the Scovill Manufacturing Company to take charge of its California office, January 1, 1925. Mr. Goldsmith is a well known ex-service man, having served with the engineer corps in France during the World War.

F. S. Chase, president of the **Chase Companies,** discussed the St. Lawrence River and Great Lakes power project at the annual meeting in Hartford, last month, of the State Manufacturers' Association. **John H. Goss,** vice-president of the **Scovill Manufacturing Company,** for the benefit of those present, asked Mr. Chase a series of questions, among them, if New England would be willing to lend her cooperation to the movement. He answered in the affirmative, but said that New England wants the cost and distribution of power to be on a fair basis.—W. R. B.

BRIDGEPORT, CONN.

JANUARY 5, 1925.

Bridgeport factories, according to **C. A. Willard,** assistant secretary of the Chamber of Commerce, have already begun to feel the effect of the after-election prosperity. Business was somewhat dull during the summer months, but within the past few months has greatly improved and gives promise of increased development for 1925. Industrial payrolls at the present time are from 85 to 87 per cent of normal and many of the plants are running at 100 per cent. The lowest figure for any concern is 65 per cent, but the average seem to be 85 per cent or higher.

Mr. Willard states with regard to the local manufacturing firms:

"The **Bridgeport Brass Company** showed a material increase in business during November over the prior month and the plant is now running at about 75 per cent of normal as com-

pared with 60 per cent during the summer. The condition now is much healthier than it has been, and the concern is receiving a larger variety of orders.

"During the past few months there has been a slight improvement at the **Singer Manufacturing Company.** This is due largely to receipt of foreign orders and not to domestic business.

"For the past six months," it was stated at the **American Chain Company,** "we have noticed an upward trend in buying. Specifications have been coming in freely and one thing that has been most apparent is the lack of speculative commitments by our costumers. In other words, a number of orders have been received from a house over a given period where formerly one large specification would suffice. Our opinion is that the next few months will see an orderly advance in business, and by such progress the evidence for real prosperity should be laid.

"The **Bullard Machine Company** states that it is enjoying a healthy but not abnormal business. Inquiries from concerns who have not been in the market for some time are coming in and there is every indication that business from these will materialize after the first of the year.

"The largest part of the **Bridgeport Metal Goods Manufacturing Company's** business is in seasonal holiday goods and the business fluctuates a little. At the present time the plant is running 100 per cent. Job contract work has been poor, but inquiries are beginning to come in. The year 1923 was the best in the history of the company and 1924 will exceed that.

"Business at the **Remington Arms** is largerly seasonal and this is the off time of the year for the munition business, so this department is a little slow at present. The cutlery department, however, has just closed a very large order which will keep the plant running at 100 per cent or better during the entire winter.

"The **Bridgeport Hardware Manufacturing Company** has been receiving large contracts from manufacturers, but not as many as usual from their regular trade. Foreign business has fallen off. At the present time, however, the plant is running at 100 per cent, has sufficient work to keep it in operation for at least 90 days, with every indication that orders from the regular trade will increase after the first of the year.

"The **Crane Company** is now averaging about two-thirds of normal. Many inquiries are being received and some orders have been received to be filled after the first of the year.

"Business at the **Bryant Electric Company** has not been very low at any time during the past year, but there has been a recent improvement. They do not expect an abnormal increase immediately after the first of the year, but they expect a good increase in the spring.

"This month and the past year at the **Holmes & Edwards Company** compares favorably with last December and the year 1923. Business is good, the outlook is good and they are looking forward to increased activity.

"Business at the **Acme Shear Company** is holding up very well for this time of the year when it usually lags. They are running full time and are very optimistic about the coming year."

The **Bridgeport Brass Company** has won the first point in its suit to prevent Tax Collector Edward Drew from seizing its property to satisfy taxes which Drew says are unpaid on property valuation alleged by him to have been unlawfully made by former Tax Commissioner, Arthur F. Connor. In overruling Drew's demurrer to the company's complaint, Judge Christopher L. Avery holds that it will be for a trial court to determine the respective claims of the company and the city in the matter of the tax collection.

Application for discharge from bankruptcy has been filed by the **Morris Metal Products Company.** The company failed in April with liabilities of more than $1,000,000. **Kenneth McNeil,** vice-president of the company, who was a creditor of the company to the amount of $80,800, signed the application. He bid in the land, buildings and machinery at auction for $220,500. All matters having to do with the estate are now settled, with the exception of a claim of $2,800 which McNeil has against the firm.

Sale of the assets of the **Bridgeport Iron and Metals Company** and its subsidiary, the **Acorn Trading Company** has been confirmed for $11,600. This does not include the real estate on which there is a mortgage of $5,000 nor the $7,000 worth of goods involved in reclamation proceedings by former owners. A composition offer of 15 per cent, made by President **William Olderman,** has been rejected by the creditors, but **Referee Keogh** has allowed a new hearing for reconsideration of the offer. He also wishes to re-examine the president regarding the discrepancy of $58,000 between the company's issued financial statement of April and the books of the concern.

Injunction proceedings to restrain the **Bullard Machine Tool Company** from making automobile bumpers, which, it is alleged, infringe on patent rights held by the plaintiff company, have been begun in the United States District Court by the **American Chain Company.** The plaintiff claims the bumpers made by the defendant are made under a patent issued to **Thomas A. Hoover,** of California, and later acquired by it, while the defendant claims the bumpers are made under a patent granted **Richard Newton** and acquired by the Bullard Company. The suit is one of several being undertaken by the American Chain Company against alleged infringements of patent rights, on the ground that Hoover was the true and original inventor of all these bumpers. The defendant's claim many other inventors took out patents on bumpers.—W. R. B.

TORRINGTON, CONN.

JANUARY 5, 1925.

General conditions in the metal industries in Torrington during the past year showed material improvement. The plants have been working more hours, with increased working forces and in some cases paying more wages than during the preceding year. Deliveries have been better and the quality of materials more satisfactory.

There is every indication of steady improvement continuing through the year just beginning. Practically all the shops are working on full schedules and orders are being received in a most satisfactory manner. So far as building expansion is concerned there is no likelihood of much being done in that line during the next ten months as there is sufficient room and equipment in all the plants to take care of at least ten per cent increase over the present volume of manufacturing. Two or three of the shops, notably the **Union Hardware Company,** did considerable building during the past year. A big addition to the **Hotchkiss Brothers** plant is now nearing completion. Incidentally, the Hotchkiss Brothers Company, which a year ago was in the hands of a receiver, is now firmly back upon its feet. During the week preceding Christmas every employe of the Hotchkiss company received a five per cent bonus on the year's pay.

Most of the plants will close down for periods of from one week to ten days early this month for the customary inventories.

The **Dayton Manufacturing Company** has been organized in Torrington and incorporated with capital stock of $25,000, to manufacture tools and other metal products. The directors are: James M. Dayton, Frederick P. Weston, Frank J. Damon, Howard J. Castle, Clive B. Vincent, George H. Braman, and Irving B. Holley.

On Monday evening, December 15, the corporators and medical staff of the **Charlotte Hungerford Hospital** gave a testimonial dinner at Conley Inn, to **Uri T. Hungerford,** donor of the hospital. Unfortunately, Mr. Hungerford, owing to the state of his health, was unable to be present, but he sent a representative in the person of **Bernard Ris,** of Brooklyn, N. Y., a close personal and business associate. Announcement was made at the dinner of the gift by Mr. Hungerford of an endowment fund of $200,000, the income from which is to be used for the expenses of the hospital. The fund is invested in the Hungerford Corporation.—J. H. T.

NEW BRITAIN, CONN.

JANUARY, 5, 1925.

The year just closing finds New Britain's metal manufacturing industries in a very healthy condition, with business somewhat better than it was a year ago, and the outlook more positively optimistic than at this time of 1923. The year,

however, has seen a number of important changes here, notably the shake-up at the **Traut & Hine Manufacturing Company,** and more lately a not dissimilar shifting at the **North & Judd Manufacturing Company.** The Traut & Hine firm at present gives promise of slowly regaining its place in the industrial world. **E. N. Humphrey,** for many years its factory director and who resigned to go into business for himself, finds that his new enterprise promises well for the future.

The death of **President H. C. Noble,** of the North & Judd Manufacturing Company a couple of years ago, was the signal for a slow but definite change at the factory. These changes came to a head this month when Raymond H. Sullivan, an efficiency expert, and at one time with Yale and Towne, succeeded General Superintendent **Michael J. O'Hayer** as works manager. Mr. Sullivan also became a vice-president of the concern, while Mr. O'Hayer becomes assistant to E. M. Wightman, vice-president, in charge of the sales department. **G. W. Troop,** assistant sales manager, goes to New York as resident manager of that office, succeeding **Colton D. Noble,** resigned. **Arthur H. Parker,** for 18 years cashier, also has resigned, and a number of minor officials likewise have left. It is reported that a general stimulus is sought, and those in charge of the firm are predicting a more lively future.

Another important change in the local industry is the resignation of **H. C. M. Thomson,** as president of the **American Hardware Corporation,** to be succeeded by **Vice-president George T. Kimball.** Mr Thomson, who succeeded the late **Col. C. M. Jarvis** about a decade ago, has been largely instrumental in reestablishing the prosperity of the concern and his resignation has been occasioned by series ill health. Incidently, this same concern at its December meeting declared the usual 75 cents dividend and an extra of like amount.

Santa Claus also visited the **Landers, Frary & Clark** plant and the regular 2 per cent dividend plus an extra of three per cent was declared this month. This firm is in a flourishing condition and is gradually specializing in its electrical equipment department and slowly eliminating a number of other articles which have ben manufactured. At this concern most of the departments have resumed the regular 10 hour schedule and the same thing holds true at the **Stanley Rule & Level Company,** where business is improving. The Stanley Works, near the crest of production, likewise has restored the 10 hour schedule in many of their departments which were slowing down.

A summary of the past year would be that conditions in New Britain have compared most favorably with those anywhere in the country, while the outlook for next year is equally good. The gist of official statements is that practically all lines are picking up, but the increase is coming so gradually that its effect is not so noticeable as it would be in the case of a boom.—H. R. J.

PROVIDENCE, R. I.

JANUARY, 5, 1925.

The year 1924 has been a somewhat erratic one, industrially and the metal trades, in keeping with almost all other lines has been spotty as regards business activities. The various lines connected with the building trades have shown slight improvement over the preceding year, but have been nowhere near normal, although there has been considerable special cornice and frontal work. The jewelry branches have continued to drift aimlessly with comparatively little encouragement. Manufacturers of novelties, specialties and a few "sport" or "fad" lines have had sporadic activity. But this has been neither continuous nor lengthy. On all sides, however, in practically all metal lines there is an encouraging atmosphere that seems to auger well for the new year.

One of the new corporations in the jewelry industry is the **McRae & Keeler Company** of Attleboro, incorporated under the laws of Massachusetts to take over the business conducted for several years by McRae & Keeler. The capital stock is $100,000 and the incorporators are Arthur A. McRae and Lawrence P. Keeler of Attleboro and Samuel J. Greene of Providence. Mr. McRae is president; Mr. Greene, treasurer, and Mr. Keeler, secretary, and all three compose the directorate.

The **Atlas Sheet Metal Works, Inc.,** has been especially fortunate in keeping busy and has recently had several good commissions. Notable among these was the interior and exterior metal work for the new Wolfe Brothers store, this city.

W. C. Dodge Company has just completed the equipment of a new department plant for the refinishing automobiles by a new lacquer system, at 466 Valley street.

A lacquer refinishing plant for automobile work has been installed by **J. G. McIntosh, Inc.,** at 284 Brown street.—W. H. M.

MIDDLE ATLANTIC STATES

ROCHESTER, N. Y.

JANUARY, 5, 1925.

Business conditions in Rochester and vicinity have been fairly good during the year that is about to close. Of course this view is given when estimates of each month are taken into consideration. The early part of 1924 was very active, every metal-using establishment being operated at normal speed and the output from each plant being quite readily absorbed by a steady demand. In March, however, business slackened and the retrograde movement continued from month to month until September, when a firmer market appeared in some lines of trade and several plants became more active. Just before election better business was noted among the brass foundries, and at several plants which use metals to a great degree. Immediately after election it was noted that every brass foundry in Rochester was operating under normal conditions, and there were no idle brass workers in the city.

The holiday season is usually a quiet one in manufacturing lines, but this year most institutions in Rochester are found to be rather busy. A few of the larger concerns have slowed down somewhat since the first of the month, which fact has not excited much notice owing to the fact that these plants reduce their daily output a fortnight before January 1st because of annual inventory.

Inquiry among manufacturers and members of executive staffs at several of the larger plants reveal almost a unanimously optimistic trend of opinion as to the prospects for the New Year. It is reported, from authoritative circles, that already nearly every one of the big manufacturing plants in Rochester has unfilled orders that assure full time operation until spring, and that based on present indications there will be no dull season in 1925.—G. B. E.

NEWARK, N. J.

JANUARY 5, 1925.

The big plant of the **Butterworth-Judson Company,** along the Passaic River and Newark Bay Waterfront, which was erected during the war, will be sold at receiver's absolute auction, an January 21. The receivers are **Thomas G. Haight** and **Henry G. Atha.** A large percentage of the acid produced in this country for use during the world war was manufactured in the plant. The property comprises 77 acres and a number of buildings containing several hundred thousand square feet of floor space.

In an effort to bring a patent suit, filed some time ago, to an early focus, the "Big Four" in the radio world obtained an order from **Federal Judge Bodine,** directing two companies and one individual to show cause why they should not be enjoined, pending trial, from further alleged infringments on a radio vacuum tube patent. The **Lampson Lamp Company, Newark; Jacob Kahn** and **Lorraine Electrical Supply Company,** Passaic, N. J., are the defendants. One of the **DeForest** patents is in issue. The order was obtained for the **DeForest Radio Telephone & Telegraph Company, Westinghouse Electric & Manufacturing Company, American Telegraph & Telephone Company** and the **Radio Corporation of America.**

Federal Judge Lynch has appointed **Milton M. Unger** receiver for the **Van Le Corporation,** manufacturers of radio reproducers, Jersey City, N. J. An involuntary petition in bankruptcy was filed against the corporation by a creditor.

An order has been issued by **Federal Judge Runyon** to show cause why an equity receiver should not be appointed for **Gehman & Weinert, Inc.,** radio apparatus manufacturer of Newark, N. J. The order was obtained by **Kling Bros.,** of Chicago. The defendant company has a capital stock of $125,000.

Sidney Simandi has been discharged as receiver of the firm of **Sontag & Miron,** manufacturers of metal store fronts, Newark. He was named to assist in the liquidation of a partnership claimed by Miron and Sontag.—C. A. L.

TRENTON, N. J.

JANUARY 5, 1925.

The metal industry in Trenton held its own during the past year, and while business was slack at times, as a whole, it was good. An indication of the way some of the large concerns are going after business is reflected in the amount of money that these companies are to spend for advertising during the coming year. This sums up the fact that every manufacturer is optimistic over the future. Officials of the concerns are looking for an increase in the cost of raw materials after the first of the year and a ten per cent jump is expected. Of course, this increase will be passed along to the consumer.

LeBair Evans Company, of 46 West State street, Trenton, N. J., has been incorporated here with $39,000 capital, to engage in the automotive, electrical and radio equipment business. The incorporators are: Leonard R. Evons, Richard C. Chamberlain, Jr., of Trenton, N. J., and W. R. LeBair, of Philadelphia.

The following concerns have been incorporated at Trenton: **Milo Manufacturing Company,** manufacture radio parts, $35,000 capital, Newark, N. J.; **Strode Battery Service,** batteries, 1,000 shares, Camden, N. J.; **Gloria Manufacturing Company,** manufacture radio supplies, $500,000 capital, Newark, N. J.; **Delsordo Manufacturing Company,** manufacture radio supplies, $100,000 capital, Newark, N. J.; **Simplex Gas Apparatus Company,** manufacture gas burners, $1,000,000 capital, Boonton, N. J.; **Metzger & Loveland, Inc.,** electrical welding, $50,000 capital, Perth Amboy, N. J.; **Lanco Manufacturing Company,** manufacture electrical supplies, $125,000 capital, Newark, N. J.; **Western Electrical Instrument Corporation,** manufacture electrical instruments, 200,000 shares, no par, Newark, N. J.; **Esteroc Manufacturing Company,** manufacture radio supplies, $100,000 capital, Newark, N. J.; **Summit Radio Manufacturing Company,** manufacture radio supplies, $50,000 capital, East Orange, N. J.; **Crescent White Metal Company, Inc.,** manufacture white metals, $100,000 capital, Newark, N. J.—C. A. L.

BALTIMORE, MD.

JANUARY 5, 1925.

A well-defined optimism is expressed by the leaders of the metal trades in Baltimore. The rise in prices has stimulated production and led to a larger employment of workers, and it is the generally expressed opinion that the outlook in this industry is better here than it has been at any time in the past twelve months.

Experiments in the use of copper pipe in parts of Baltimore's City Water System have recently been made, with very favorable results, and this has led to the purchase of considerable quantities of this article.

Baltimore's historic shot tower, whose owners last August proposed to wreck it in order to use the land on which it stands for a more modern structure, has been purchased by a **Citizen's Committee,** and will be presented to the **City of Baltimore** as a public possession. Only the technical details of its conveyance remain to be executed. The Park Board of the city will take it in charge, making it available to visitors at all times. Within an amazingly short time the campaign to raise funds to purchase this old landmark was successfully waged. All the patriotic and historical societies rallied to the call of the Citizen's Committee, of which **George L. Radcliffe** was chairman, and the success of its aim was soon assured.

William H. Pierce, president of the **Baltimore Copper Works,** and vice-president of the **American Smelting & Refining Company,** who was injured badly in an automobile accident on December 13th, has recovered sufficiently to leave Mercy Hospital, and it is believed will suffer no permanent hurt. The accident was the result of his taxicab colliding with a truck.

Dr. James F. Norris, the newly appointed president of the **American Chemical Society,** was born in Baltimore, January 20, 1871, and received his bachelor of arts degree from John Hopkins University in 1892. Three years later, that university conferred upon him the degree of doctor of philosophy. He has been professor of organic chemistry at the Massachusetts Institute of Technology since 1920, and formerly taught at Simmons College and Vanderbilt University. Dr. Norris held the rank of lieutenant-colonel in the Chemical Warfare Service during the World War, and was in charge of chemical research in war-gas offense in the United States Bureau of Mines. He was also an associate on the naval consulting board during the war period, and was in charge of chemical warfare service for England, and inspector of German chemical war-gas factories.—H. L. B.

PITTSBURGH, PA.

JANUARY, 5, 1925.

Manufacturing conditions generally among the metal industry through Western Pennsylvania were rather slow the first six months of 1924, and only slight improvement was noted during the last half of the year, with most of the improved conditions showing up since the national elections in November, when a gradual improvement of industrial conditions has been in evidence. Firmness in prices and improved positions in order books is noticeable. The more confident leaders in the industry now speak with more assurance concerning the first six months of 1925, whereas recently their expressions were limited to the first quarter.

In keeping with its policy of expansion the **Westinghouse Electric & Manufacturing Company** now has two new buildings and one addition under construction at the main works of the company at East Pittsburgh. The three buildings will be of modern construction and it is expected they will be completed and ready for occupancy by the first of the year. The new addition will be used solely for the manufacture of radio tubes.

The J. F. McClurg Company and H. I. Adair have sold for the Fidelty Title & Trust Company, trustee of the Alexander Nimick estate, to the **Eagle Picher Lead Company** of Chicago, 122 x 170 feet, vacant, on West Carson street, near the Point bridge, Pittsburgh, for $45,000. The buyer will erect a warehouse covering 22,000 square feet of this space.—H. W. R.

MIDDLE WESTERN STATES

INDIANAPOLIS, IND.

JANUARY, 5, 1925.

The **Clark Aluminum Last Company,** Mishawaka, Ind., which has a branch in Windsor, Canada, depends largely on the rubber shoe industry for its business. While the business is a little dull at present, the company officials believe that in a short time there will be a noticeable increase. The foundry and factory are well equipped and in a position to take care of a big business.

Henry T. Hearsey of Indianapolis has been named receiver for the **Pioneer Brass Company** of Indianapolis by the judge of probate court. The petition for receiver was filed by **John H. Brikmeyer** of Indianapolis, president and one of the stockholders of the company. His petition alleges the company's assets of $250,000 exceeded its liabilities, but that due to the

present financial depression, money could be saved the stockholders if a receiver were appointed. Judge Bash, in court, said he believed the firm to be solvent and that the suit was a friendly one.

The **Terre Haute Bronze and Brass Foundry** at Terre Haute, Ind., recently produced what are said to be the heaviest aluminum castings ever made in that section of the country. The castings weighed about 200 pounds each. Some sections of these castings were more than two inches thick, while other sections were much thinner, but they showed no sign of shrinking or cracking and required but little labor after removing them from the sand.

Judge A. B. Anderson of the Federal Court in Indianapolis has adjudicated the **Haynes Automobile Company,** Kokomo, Ind., a bankrupt and the case has been referred to the referee in bankruptcy for Indiana. An involuntary petition was filed against the company in September, the petitioners being the **Chicago Tool and Kit Company,** the **Grinding Wheel Clearing house** of Detroit and **H. Merrifield** of Chicago.

The **E. N. Cooke & Company,** tire and nickel plating business, has moved into space rented in the factory building of the Hugro Company, which went out of business in Warsaw, Ind., recently.—E. B.

DETROIT, MICH.

JANUARY 5, 1925.

The **Standard Aluminum Castings Company,** at Lansing is installing a third furnace, which, it is said, will treble the company's capacity. More than a year ago this company leased the old Standard Casting Company's property and remodeled it. It has been making steady progress since its organization.

The **Superior Plating Company** has recently been incorporated in Detroit, with a capital stock of $20,000, for the purpose of engaging in electro-plating, nickel-plating, burnishing, grinding and buffing. The stockholders are Hagop Jorjorian, Nishon M. Berberian and Mesrob Q. Kurjian. The address is 382 Elmhurst avenue.

The **General Aluminum and Brass Manufacturing Company,** it is announced, will redeem all outstanding preferred stock, not then exchanged for new preferred of the **Bohn Aluminum & Brass Corporation,** on January 1, at a premium of $10 a share, at the Detroit Trust Co., Detroit, and the Guardian Trust Co., at Cleveland.

According to a recent statement issued to directors by **Francis Palms,** first vice-president of the **Michigan Stove Company,** this organization has completed the best year in its history. Sales of gas, electric and coal stoves are 10 per cent over 1923. The company now lists 3,000 sales agencies.

It is announced that the **Champion Brass Works,** at Coldwater, recently destroyed by fire, will be rebuilt.

Fred Galster, general manager of the **Acme Wire and Iron Works,** Detroit, who was recently elected treasurer of the **National Association of Ornamental Iron and Bronze Manufacturers,** is receiving congratulations from his many Detroit friends. Mr. Galster has been identified with the ornamental iron and wire industry in Detroit for the past 25 years and for the last three years has served as president of the Detroit Ornamental, Bronze and Wire Club.

G. W. Craighead, who, for the past year, has been head of his own accountancy office, has joined the **Sterling & Skinner Manufacturing Company,** manufacturers of brass goods for steam, water and gas, as secretary of the company. A number of changes have geen made in the organization to improve its service to patrons.

The **McCord Radiator & Manufacturing Company,** recently held its fourth annual sales convention. The meetings took up the entire week, and policies for the coming year were fully discussed. Figures were shown that this, the 25th year of McCord participation in the automotive industry, was the biggest in the history of the company. Prospects indicate the coming year will be still better. One of the features of the convention was the attendance of several prominent McCord jobbers, who came to obtain first-hand information on the manufacture of radiators and all kinds of copper, asbestos and cork gaskets. These men took part in many of the discussions and gave short talks concerning their part in the sale of McCord motor products throughout the country.

The **Detroit Electric Stove Company** has recently purchased 340 foot frontage in Lincoln Park, a suburb of Detroit, where it plans to erect, after January 1, the first of two units of a new plant, each to be 100 by 75 feet and three stories high.

The **Detroit Bronze Bushing Company** has been organized at Detroit with a capital stock of $50,000, for the purpose of engaging in the manufacture of brass and bronze products. Headquarters for the present are located at 628 Collingwood avenue. The stockholders are D. C. Stevenson, R. R. Sterling and J. C. Danzyer.—F. J. H.

CHICAGO, ILL.

JANUARY, 5, 1925.

With business in almost every industry throughout the country on the pick-up, metal dealers in the Chicago locality were certainly not unaffected, and during the past few weeks they have been experiencing one of the best periods in their history. The metal market has not only been active, but every indication, according to dealers, seems to point toward continued briskness.

Prices of virgin and scrap metals have been advancing steadily of late in the Chicago market, with lead particularly strong. An advance of one cent a pound in the price of type metals was put into effect by the **Great Western Smelting & Refining Company,** a part of the **Federated Metals Corporation.** The advanced prices are a result of the increased cost of raw materials, and the Federated Metals Corporation has announced that further advances in the cost of raw materials will result in additional increases in type metal quotations.

At the present time, this corporation is building a large addition to its plant in Newark, N. J. The new portion of the plant is expected to be completed before spring and will mean an addition of several hundred employes to the present factory personnel of the company. Ivan Reitler, president, spent several days during the early part of December in New York on business.

The **Argo Iron & Metal Company,** 1662 Elston avenue, suffered a small loss by fire which recently broke out in the plant.

The **Illinois Zinc Company,** one of the oldest and largest rollers and smelters of zinc, recently acquired ownership of the ore mines of the Queen Esther Mining Company, and a large acreage of other highly mineralized property. The purchase was made through the Peru Mining Company, a subsidiary of the Illinois Zinc Company.

Fire that originated in the heating apparatus recently caused $15,000 damage to the plant of the **Gardiner Metal Company,** Forty-eighth place and Rockwell street.

Radio supply companies are on the increase in the Chicago region. Recent incorporations in this line announced by the secretary of state of Illinois are as follows:

Buckwalter Radio Corporation, 2632 Prairie avenue, capitalized at $31,000. The incorporators are C. J. Buckwalter, W. L. Bourland and Paul Hassell.

The **Monarch Radio Corporation,** 451 East Ohio street, capitalized at $100,000 and 1,000 shares no par value. The incorporators are Emil C. Wetten, Paul N. Dale and Jay T. Border.

Barnett-Lloyd Company, 19 South Wells street, capitalized at $50,000. The incorporators are Richard S. Barnett, William F. Lloyd and Nicholas Kreitz.

The **Vlahos Radio Corporation,** Rooms 2064-65, Congress Hotel, capitalized at $20,000. The incorporators are L. M. Viner, M. Z. Vlahos and C. G. Vishos.

Other recent incorporations of interest to the trade are:

The **Illinois Auto Electric Company,** 2450 Calumet avenue. Capital, $10,000. Incorporators, Gunnard Rubins, Joseph Sirotek, Charles Pelo and W. E. Bentley. Manufacture and deal in auto accessories.

Frank J. Feeney, Inc., 7356 Stony Island avenue. Capital, $50,000. Manufacture and deal in automotive parts and supplies. Incorporators, James D. Murphy, James J. Kelly and Joseph D. Daly.

Perry Wright Company, 5613 West Lake street. Capital, $50,000. Manufacture and deal in auto accessories. Incorporators, Ira D. Perry, Ivan L. Taylor and William H. Babcock.

Road Leader Manufacturing Company, 117 North Dearborn street. Capital, $10,000. Manufacture and deal in automobile accessories and parts. Incorporators, Joseph J. Sherman, Cilie Sherman and Philip Sherman.

Standard Store Front Construction Company, 410 South Michigan avenue. Capital, 10 shares non par value. Manufacture and deal in metal store front construction. Incorporators are S. E. Sutcliffe, M. Chapin and Henry K. Chapin.

Howard-Seymour Company, 608 South Dearborn street. Capital, $35,000. Manufacture and deal in jewelry, watches and silverware. Incorporators, Charles Dan, Samuel Oster and Hannah H. Wolfson.—I. B. G.

OTHER COUNTRIES

BIRMINGHAM, ENGLAND

DECEMBER 22, 1924.

The metal trades of Great Britain are finding a steady expansion of business. The improvement in the sterling value has given the metal manufacturers great assistance in reducing the cost of their raw material. The orders for British locomotives are bringing to Birmingham much new work in the way of copper, bronze and brass tubes, this business being regarded as likely to expand very greatly in the new year. The rapid progress in wireless has increased enormously the consumption of copper wire, and the electric lighting trades are finding steady expension. Much progress has been made by the manufacturers of electric fittings in the improvement of patterns, Continental demand having been a most hopeful feature lately. Manufacturers of nickel silver are completing a busy year, the principal firm having lately acquired an additional factory. Shipbuilding requirements are unfortunately still small, but various hardware trades are taking larger quantities of metal.

The **Birmingham (Eng.) Metallurgical Society** recently celebrated its coming-of-age in connection with its annual dinner and a silver medal was presented to its retiring president, **Harold B. Jacks,** as a memento of his term of office. **Ambrose Hopper,** managing director of **Elliotts Metal Company, Ltd.,** speaking at this dinner acknowledged the valuable help given by the association to the metal industry. It had done much to destroy the old traditions of prejudice existing between managers and workpeople and the new exponents of metallurgical science. When he joined his company twenty-one years ago the new inventor was usually met with antagonism, and on one occasion a director was told that he would not be allowed to enter the refinery. In the casting shop a scientific expert who ventured to enter was promptly ordered out.

A new process has lately been evolved in Birmingham for adding colored bronze to the surface of metals. The work has been done by Messrs. **Ashton** and **Moore,** two students of the University Metallurgical Society who have established a factory in Birmingham and are turning out numbers of articles by means of the new process.—J. H.

Business Items—Verified

The **Bell Modeling & Chasing Company** has opened a shop at 25 Bleecker street, New York City, for the manufacture of dies and molds for chandelier and novelty trades.

J. Cassara, for many years with **Simon Zinn, Inc.,** has purchased the shop of the **Triangle Metal Plating Company,** at 111 East 9th street, New York, where he will do job work in gold, silver, nickel and copper.

The **Ideal Stamping Company** is now located in the new building at 196 Canal street, New York City, doing stamping in brass and copper, as well as silver and gold. The company specializes in metal parts for fountain pens.

The **United American Metals Corporation,** Brooklyn, N. Y., announces that E. C. de Villaverde is now associated with that company. Mr. de Villaverde is a bearing specialist and metallurgist and has lectured on the subject in several countries.

The **New Haven Copper Company** recently purchased for its plant at Seymour, Conn., two 20″ mills and one 16″ mill for cold rolling strip copper. These mills were in the plant of the now defunct New Jersey Tube Company, in Harrison, N. J., and had been built by the Farrel Foundry & Machine Company.

Wakefield Brass Company, Vermilion, Ohio, manufacturer of lighting fixtures, etc., has authorized the immediate rebuilding of the portion of its main plant destroyed by fire December 4, with loss of approximately $50,000, including machinery. **Albert Wakefield** and **G. L. Basil** are in charge. This firm operates the following departments: brass machine shop, tool room, stamping, polishing, lacquering.

The **United States Wire Die Corporation,** 233 Broadway, New York, recently incorporated with $60,000 capital stock, will manufacture wire drawing dies. The company purchases from time to time standard types of machine tools and special machinery. Diamond dies of all sizes will be manufactured. **T. G. O'Brien** is president. This firm will operate the following departments: tool room, grinding room, stamping.

The **Maxon Premix Burner Company** announces the consolidation of the **Maxon Premix Burner Company** and the **Maxon Furnace and Engineering Company.** The consolidated companies will operate as the **Maxon Premix Burner Company.** The factory and main office remain in Muncie, Ind., branch offices are to be maintained in Chicago and Pittsburgh. There is also, it is stated, to be an Eastern office established.

The **Lawrence Products Company,** Legal street and Pennsylvania R. R., Newark, N. J., recently incorporated with $100,000 capital stock, plans to manufacture and deal in lead and lead products. Work has just been completed on a plant at Waverly, N. J., and operations have been started on a small scale. The company is in the market for any tonnage of battery lead, lead drosses, scrap lead, and cable lead. M. E. Zuckerman is vice-president. This company operates a smelting and refining department.

The **Niagara Falls Smelting & Refining Corporation,** of Buffalo, N. Y., directors have declared the regular quarterly dividend at the rate of seven per cent (7%) payable on January 15, 1925, to stock of record December 30th. This company has paid seven per cent per annum since its incorporation and **Ernest G. Jarvis,** vice-president and general manager, said that balance sheet as of December 31st and operating statement would accompany dividend checks. He further stated that substantial surplus had been set up from the current year's earnings and that the capacity of the plant had been tripled during the year.

A reorganization has been effected in the **Anderson Chemical Company,** of Passaic, N. J., resulting from the purchase of this company on December 24, 1924, by the **Merrimac Chemical Company,** of 148 State street, Boston, Mass. The former personnel of the Anderson Chemical Company has been retained and the resources of the Merrimac Chemical Company have been made available to it. The policy of the new organization will be to continue producing the same high-grade products that have been produced heretofore, including Split Leather Dopes, Lacquers, Lacquer Enamels, Solvents, Belt Cements, Thinners and Nitro Cotton Solutions. The company will continue to operate under the name of the Anderson Chemical Company. The new officers of the company are: Charles Belknap, president; H. O. Lichtenwalter, vice president; W. I. Warren, assistant treasurer; Miss Josephine Eberhard, secretary.

Harry **Tyroler** has opened a store at 475 Broadway, Brooklyn, N. Y., where he will carry a full line of new and used motors and dynamos.

The **Celluloid Zapon Company,** New York, N. Y., has changed its name to the **Zapon Company.** This went into effect January 1, 1925.

John **Humm,** tool and die maker has added a department for metal stamping and the turning of spinning chucks, at 242 Canal street, New York, N. Y.

Lewis Roe, well known platers' supply salesman, has established a business at 314 Van Buren street, Brooklyn, N. Y., where he will specialize in used buffs and wipers.

N. Meddeloni, has fitted up the entire building at 110 Withers street, Brooklyn, N. Y., as a job plating shop. He makes a specialty of grinding and plating surgical instruments, as well as a general line of nickel plating.

S. F. Smith & Son have purchased the old established plating shop of C. H. Doty, at 11-13 McKibben street, Brooklyn, N. Y. This firm specializes in nickel plating and operates the following departments: plating, polishing, lacquering.

The **Newhouse Foundry,** 259 Lafayette street, New York, N. Y., is manufacturing a new air friction carburetor suitable for all types of automobiles. This firm will operate the following departments: brass, bronze and aluminum foundry; brass machine shop.

At a meeting of directors of the **Brass Goods Manufacturing Company,** 345 Eldert street, Brooklyn, N. Y., held recently, the following officers were elected: **Frank S. Hyatt,** president and treasurer; **Edward H. Bancker,** vice-president; **Lorenzo H. Pike,** secretary and assistant treasurer.

The **Lincoln Forging Company,** Detroit, has been organized as a subsidiary of the **Monarch Manufacturing Company,** that city. It is planned to make most of the castings used by the parent company in the forging plant, which will be operated by the new company. In a new plant, recently built, the company will do outside jobbing in brass and bronze forging. **William Coyer** is manager.

The **Diamond Power Specialty Corporation,** of Detroit, Mich., manufacturers of Diamond Soot Blowers for water tube and horizontal return tubular boilers, has appointed the **Midwest Machinery Company,** 104-106 So. Main street, St. Louis, Missouri, as representative for the territory of Missouri, adjacent to St. Louis, south of and including Springfield and Decatur, Illinois. The Midwest Machinery Company consists of **M. M. Stone** and **B. G. Proetz,** both of whom are graduates of the University of Washington.

TINFOIL COMPANY ABSORBED

Lehmaier, Schwartz & Co., Inc., announce that they have purchased the manufacturing equipment of the Conley Foil Company now in liquidation. On and after January 2nd, 1925, they will operate their former plants in addition to their own factories.

BUSINESS TROUBLES

An order was made December 17, 1924, enjoining and restraining the **Hilton Brass Foundry,** Newark, N. J., its officers and agents from exercising its privileges and franchises, and appointing **John E. Sandmeyer** receiver for the stockholders and creditors.

NEW PORTABLE ARC WELDER

A new portable arc welder, said to embody distinctive features of economy, simplicity, adaptability and dependability, is now on the market. This unit it is stated by the manufacturer was designed to insure smooth and rapid deposition of metal with thorough penetration. It will deliver continuous power and permit rapid production, both with high current and large electrodes, as well as with low current and small electrodes.

This welder is a two-unit set, consisting of a motor and a generator. The generator is self-excited, thereby eliminating the necessity of a separate exciter. All regulation of current is accomplished by turning a handwheel on the generator. A self-adjusting, stabilizing reactor is provided, which automatically steadies the arc under all welding conditions.

The new welder is made by the General Electric Company. It can be used with any of the commercial sizes of metallic electrodes from 1/16" to ¼" in diameter. Generator voltage can be adjusted to suit the character of the work. High voltage for complete penetration on heavy work and low voltage to prevent burning through on light work are thus secured at will. Any value of current between 75 and 300 amperes can be obtained in a large number of steps between these limits.

OAKLEY COMPANY CONFERENCE

On December 1, 2, 3 and 4, 1924, the Oakley Chemical Company held its eighth annual conference on Industrial Cleaning Methods, which complete sixteen years of cleaning service to industry. This group of men comprised the world's largest organization of industrial cleaning specialists. The meetings were held at the Hotel Pennsylvania and at the offices of the Oakley Chemical Company.

OAKLEY COMPANY CONFERENCE

The interchange of ideas and experiences of this group of Oakite cleaning specialists is bound to stimulate the develpment of still better cleaning methods. The technical and practical papers on the program were presented by men with especially successful records in their fields. Each paper was followed by an open discussion, so that no point which might be helpful to any man was overlooked.

Among the papers read were the following:

Metal Cleaning, by O. W. Hoster.

Oakite Test Q: Its Uses and Methods of Using It, by H. C. Bernard.

Oakite Materials and Methods in Automobile Factories, by J. A. Maguire.

Stripping Paint from Automobiles, by L. B. Johnson.

METALS IN MOTOR BOATS

Metals were in evidence in great profusion at the Motor Boat Show, held in Grand Central Palace, New York, January 2-10, 1924. As usual, of course, trimmings were of brass as were also the carburetors, lamps, etc. There is no danger of their displacement in this department of the marine field. Aluminum seems to be making considerable headway, particularly with outboard motors, where the propeller, the rudder and most of the casings are being made of aluminum. Where these motors are to be used in salt water, however, the material has to be manganese bronze in order to stand up against the attack of corrosion. Among the manufacturers of motors of this type are the following:

Caille Perfection Motor Company, Detroit, Mich.
Elto Outboard Motor Company, Milwaukee, Wis.
Evinrude Motor Company, Milwaukee, Wis.
Johnson Motor Company, South Bend, Ind.
Lockwood-Ash Motor Company, Jackson, Mich.

The Packard marine engine, made by the Packard Motor Car Company, of Detroit, contains an aluminum alloy crankcase and base. The Maybach-Zeppelin motor, made by the Maybach Motor Company, New York, exhibited a most interesting engine with an aluminum casing alloyed with a little steel, which produced a mottled effect on the surface. It as claimed that this alloy would stand sea water.

Manufacturers of metals and metal products exhibited at the show were are follows:

Columbian Bronze Corporation, Freeport, L. I. Bronze castings and propellers.

Hyde Windless Company, Bath, Maine. Bronze propellers, bearings, stuffing boxes, etc.

L. O. Koven & Brother, Inc., Jersey City, N. J. Galvanized iron tanks and marine specialties.

TOWNE MUSEUM OF PEACEFUL ARTS

The late Henry R. Towne, whose death was recorded in THE METAL INDUSTRY for November, 1924, bequeathed $50,000 to found a Museum of Peaceful Arts in New York City to supplement the great Museum of Art and Museum of Natural History. The Museum of Peaceful Arts is to include Agriculture and Animal Industry; of Forestry and Woodworking; of Mining and Metallurgy; of Transportation and Communication; of Engineering and Architecture; of Industrial Chemistry; of Electrical Mechanism; of Aeronautics; of the Metal, Textile and Building Trades, and of the innumerable subdivisions of all of these, including their Products, Processes and Implements.

As a most fitting industry for the first unit, Mr. Towne suggested a building devoted, wholly or in part, to Machine Tools, an industry in which this country is the acknowledged leader, for these constitute a chief part of the equipment of many other industries, and are the means whereby all the equipment of all other industries are produced.

BULGARIAN COINS CRUMBLE

Bulgarian coins which, according to a dispatch from Tatar-Pazardjik were crumbling into dust, were not made in the United States, according to coin experts. Coins have been manufactured for Bulgaria in the Philadelphia Mint, but none of these was of the kind described in the Bulgarian report.

American mints make only gold, silver, copper and nickel coins. The Bulgarian coins referred to in the dispatch were made of aluminum and zinc, and if the alloy were faulty would readily disintegrate under certain atmospheric conditions. Officials of the Bulgarian National Bank were said to be alarmed over the possibility of losing its entire new issue of 100,000,000 leva.—NEW YORK TIMES.

CENSUS OF MANUFACTURES, 1923

Dental Goods.—Establishments engaged primarily in the manufacture of dental goods (not including dental instruments and machinery) reported products valued at $32,422,494 in 1923, an increase of 25.6 per cent as compared with 1921, the last preceding census year. The products of establishments classified in this industry include artificial teeth, filling material, dental alloys, plate material, carborundum disks and wheels, mandrels, casting machines, dental files, impression materials, gold crown and bridge work, rubber plate work and suction plates and cups, workshop tools, etc.

COPPER FOR PRINTING

At the present rate of consumption, between 2,500,000 and 3,000,000 pounds of copper are used each year in the manufacture of photo-engravings, while more than 1,300,000 pounds go into the making of electrotypes.

More than 4,000,000 pounds of copper are annually consumed in the photo-engraving and electrotyping industries, according to a survey just completed by the **Copper and Brass Association**.

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America	$100	$490	$520
American Hardware Corporation	100	90½	92
Anaconda Copper	50	47½	47¾
Bristol Brass	25	10	13
International Nickel, com	25	25½	26
International Nickel, pfd	100	93	95
International Silver, com	100	125	145
International Silver, pfd	100	106	109
National Enameling & Stamping	100	32	33
National Lead Company, com	100	158½	160
National Lead Company, pfd	100	116	117
New Jersey Zinc	100	194	197
Rome Brass & Copper	100	145	..
Scovill Manufacturing Company	..	230	240
Yale & Towne Mfg. Company, new	..	69	71

Corrected by J. K. Rice, Jr., Co., 36 Wall street, New York.

Review of the Wrought Metal Business

Written for the Metal Industry by J. J. WHITEHEAD, President of the Whitehead Metal Products Company of New York, Inc.

JANUARY 5, 1925

For many months past the metal industry has been looking and hoping for better business and through many depressing periods has steadfastly maintained an optimistic spirit in the belief that conditions must ultimately improve. The closing months of the year 1924 have provided a complete justification for that optimism. Practically all of the mills in this industry are ending the year with a volume of tonnage on their order books surpassing even their most optimistic expectations. It is reasonably safe to say that in most cases there has not been a time in the last year and a half or two years when so much business has been on the books, or when prices in general have been on so satisfactory a basis. This improvement has been under way for about three months, but it is only in the last month and a half that it has been rounded into form, at least with the appearance of solidity and permanence sufficient to justify the belief that the industry is in for a long period of prosperity.

During the past few years a vast amount of publicity has been given to all the non-ferrous metals, not only brass and copper, but also to the various nickel-copper alloys. Many new uses have been found for these metals and the tonnage consumed in these new applications is one of the factors that have kept the mills going at a fairly reasonable rate even during the recent period of depression, and in the face of the enormous production facilities that have been provided. Many old established industries which regularly had been large consumers of copper and nickel and their various alloys have for a long period been practically at a standstill, and have surrendered to the newer uses the commanding position as consumers which they had heretofore enjoyed. Therefore, since it is evident that these hitherto important factors are again starting to purchase in a big way, and the newer class of consumers are further developing their business, it cannot but be apparent that in all lines of metal production, there is great hope for a prosperous period.

There has been a steady advance in prices of brass, copper and nickel silver products during the past two and a half months, the increases in December having come with such frequency as to give rise to the thought that perhaps they were unhealthy and that the higher prices would not last. However, since the price schedule followed closely the advances in raw materials, and contracts appear, for the most part, to be for definite requirements and comparatively little for speculation, it is felt that the schedules will be maintained on the present or possibly higher basis for some time to come.

There has been no change in the prices of Monel metal or pure nickel sheet and rod. In pure nickel and Monel metal tubing there has been a decided revision downward in price due to increased manufacturing facilities and economies, together with a marked increase in demand. Over a period of two or three years many manufacturing plants using various chemicals have had sample nickel and Monel metal tubes installed in places where the service was difficult and corrosion troublesome. The results have shown that there is real economy in the use of these tubes and many of these concerns are now making installations of considerable quantity of tubes both of Monel metal and nickel.

There is continued expansion of the use of Monel metal and nickel in apparatus for hotels, restaurants, dairy, food products, ice cream makers, textile mills, photographic apparatus, as well as for

many household devices and other articles in which freedom from corrosion and great strength are necessary or desirable factors. Many contracts for large tonnages are being placed by important manufacturers in these industries with the result that the producers are well satisfied with the present situation and future prospects, sharing fully the general optimistic feeling.

Metal Market Review

Written for The Metal Industry by METAL MAN

GENERAL METAL CONDITIONS

JANUARY 5, 1925.

The course of American business in 1924 was marked by considerable caution and a widespread policy of restricted buying especially during the first half of the year. There was curtailment of operation by a number of basic industries and more or less depression in trade circles. Hesitancy and irregularity were also conspicuous features in many leading markets. The adoption of the Dawes plan and the success of the subsequent loan to Germany, however, were notably favorable developments which gave rise to a more encouraging outlook both here and in Central Europe. Since the November elections there have been many successive improvements in business. A great wave of industrial activity and expanding business has steadily progressed during the last two months. Many impediments in the path of legitimate enterprise have been swept away, and the country as a whole enters 1925 with extraordinarily cheerful prospects.

COPPER

Sales of copper were in large volume in December, and this fact, taken in connection with the higher prices prevailing, indicates the return of a greater degree of confidence and a healthy demand. A general upward trend in market values was evident early in the month, and the wholesale price advanced from 14 cents on December 1st to 14⅞ cents as we close our report. Lake Copper sold up to 15 cents.

There was a heavy and sustained demand during the closing month of the year. The buying movement and the accompanying rise in price of copper reflected the spirit of optimism which has become widespread in the country generally. This decidedly favorable change can be traced to improved domestic and foreign conditions which have occurred recently. The resumption of dividend payments by the Anaconda Copper Company and the bullish opinions expressed by a prominent official of that company was the signal for a renewed exhibition of market strength for all positions.

World production of copper for the first eleven months of 1924 is estimated at 2,663,770,000 pounds, and compares with 2,471,186,000 pounds for corresponding months in 1923. Of the above output United States smelters furnished 1,646,086,000 pounds, or about 61 per cent. Chile and Peru produced 415,790,000 pounds, or about 15 per cent. The Belgian Congo, including the Kautanga mines, produced 171,738,000 pounds, and Mexico 68,274,000 pounds.

ZINC

There is a steady movement of zinc into domestic consumption and the market has made substantial gains during the last few weeks. Foreign orders have also contributed decided support to the market here. Shipments abroad have been in large volume lately, and present indications are for continued interest on the part of foreign buyers. There were large sales in December on a rising market, and the urgent demand for export has imparted a buoyant tone to the market for all positions up to end of March. The New York price December 31, 1923, was 6.62½ cents, and compares with present price of 8.05 cents. Total deliveries in November were 54,173 tons, of which 15,730 tons were for export. The statistical position is therefore considered strong. Stocks in smelters hands were decreased 11,540 tons for November, and at end of that month were 26,912 tons. This tonnage compared with 40,697 tons at end of January, 1924. Statistics for the full calendar year just closed will not be available in time for our January number.

TIN

The upward movement in tin made further progress in December. Prices were advanced to the high point of the year, and during the closing days of the year the market continued to display remarkable strength. Holdings of the Bandoeng Pool and the Federated Malay States have been undergoing steady liquidation lately, but notwithstanding the free selling in the East the market has not only absorbed the large quantities offered but has developed extraordinary firmness.

Total deliveries of tin in the United States for the first eleven months of 1924 were 60,040 tons, compared with 65,344 tons for corresponding months in 1923. Total visible supply on November 30 was 20,977 tons, against 18,971 tons on October 31, 1924, but in spite of an increse of 2,006 tons prices continued to soar. The statistical position, however, is really stronger than the foregoing figures would seem to indicate as some 10,000 or 11,000 tons of invisible stocks were absorbed in 1924 by disposal of these holdings hitherto held in the East. Statistics for the full calendar year of 1924 were not ready when we went to press. The world's visible supply is expected to show an increse at the end of December, but if the liquidation of pooled stocks means that they have disappeared through consumption the actual supplies are consequently so much smaller. But the question of production, consumption and supplies is one that must be considered in connection with the quantity of metal held in stock by sellers, consumers and dealers. The price is admittedly high and would seem to have fully discounted all bullish factors. Sales in the closing days of December were made at 57⅝ cents and up to 57⅞ cents for prompt delivery, but shortly after buyers appeared anxious for futures at 58 cents for Straits tin.

LEAD

Limited supplies and heavy consumption have placed producers in command of the market. The American Smelting & Refining Company advanced prices seven times during the month of December thereby raising quotations from 8.75 cents to 9.60 cents per pound. The general market, however, was on a still higher basis as we go to press and quotable at 10.10@10.20 cents for prompt delivery. Consuming needs and speculative activity in Europe have contributed to the present strong tone. Domestic requirements are large and manufacturers of pigments report a heavy demand for their products. World demand for lead is expanding. Output is consequently readily absorbed and will have to speed up to keep pace with increased demand. The year 1924 opened with 7¾ cents quoted by the leading producer. Prices advanced steadily until the level of 9 cents was reached by the end of February. Irregularity and frequent fluctuations were recorded during the spring and summer months, but since the middle of August the market has developed remarkable strength and made a new high record for the year. The strong foreign market has exerted decided influence on the American situation. The outlook for 1925 is for good demand and high prices.

ALUMINUM

This has been uniformly steady lately on the basis of 28 cents for 99 per cent plus virgin metal and 27 cents for the 98-99 per cent grade. Recent demand has been active and large requirements have been covered for first half of 1925. Imported aluminum has sold freely, and leading sellers are understood to have disposed of all available parcels up to July 1. Total world consumption of aluminum in 1923 is estimated to have exceeded production by 3,500 tons. Spot stocks are to all appearances small, and demand is expected to increase in 1925. The market situation is likely to become firmer in the next few weeks, and it would not be surprising if the market advanced during first quarter of 1925.

ANTIMONY

The antimony market has displayed signs of renewed vitality lately and prices have risen sharply. Supplies are light and offerings from China restricted. Some recent business was taken by shippers at 14 cents c. i. f. New York in bond for December and January shipment from the Orient. Chinese holders are bullish on the situation, and even on the basis of

present quotations offers are made with caution. Current prices have advanced to 14 cents c. i. f. New York shipment from China up to end of January, and 16½ cents is asked for nearby deliveries in carload lots duty paid. Consumers and dealers have been more interested in the market recently as the scarcity of supplies is realized. Closing price December 31, 1923, was 9¾ cents duty paid.

QUICKSILVER

The market for quicksilver is strong and price has advanced to $75.50 for 75 pound flasks, and the London quotation is up to £12.10s. Activity is limited owing to scarsity of offers at present prices. Spot stocks are light, and some business was done lately at better than open quotations for goods to arrive. There seems to be a small supply of foreign stocks which gives sellers control of the market for the time being.

PLATINUM

Price of refined platinum quotes $117 an ounce as compared with $118 a few weeks ago. The reduction stimulated buying and consumers placed orders for moderate lots.

SILVER

The recent rather sensational advance in the market for silver bullion received a check recently. The price in the New York market receded to 66⅞ cents an ounce, which compares with a high of 72⅛ in 1924. China is credited with being the active factor in bringing about the decline. Chinese interests turned sellers and with ample supplies to operate with the Oriental operators called the turn on the market. Stocks at Shanghai are in large volume, but notwithstanding that fact Chinese buying is apt to set in when the Orient is staisfied conditions favor replenishing of stocks. India and London buying was a feature lately. Heavy demand is probable by all consumers in 1925.

OLD METALS

Scrap metal prices have been prompt to reflect the sharp advances for new material. Old copper and lead have been specially wanted and strong. Holders, however, are impressed with the strength of the situation and the probability of higher prices, and are not inclined to part with supplies too freely. Buyers are due to come into the market for liberal quantities of scrap, and a broad and active market is confidently expected when the new year comes in. Prices dealers are willing to buy at are 11¾@12¼ cents for heavy copper. 10@10¼ cents for light copper, 7¼@7¾ cents for heavy brass, light brass 6¼@6½ cents, heavy lead 8¼@8½ cents, battery lead 6¼@6½ cents, old zinc scrap 4¼@4¾ cents, and aluminum clippings 21¼@21½ cents. These quotations are considered as minimum prices.

WATERBURY AVERAGE

Lake Copper—Average for 1924, 13.419—January, 1924, 13.00—February, 13.125—March, 13.875—April, 13.625—May, 13.15—June, 12.75—July, 12.75—August, 13.625—September, 13.375—October, 13.25—November, 13.875—December, 14.625.

Brass Mill Zinc—Average for 1924, 7.10—January, 1924, 7.25—February, 7.50—March, 7.25—April, 7.00—May, 6.00—June, 6.60—July, 6.70—August, 6.90—September, 7.00—October, 7.15—November, 7.65—December, 8.15.

Daily Metal Prices for the Month of December, 1924

Records of Daily, Highest, Lowest and Average

	1	2	3	4	5	8	9	10	11	12	15	16	17
Copper (f. o. b. Ref.) c/lb. Duty Free.....													
Lake (Delivered)	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.375	14.375	14.625	14.625	14.75
Electrolytic	14.05	14.05	14.05	14.05	14.05	14.05	14.10	14.10	14.15	14.20	14.375	14.375	14.45
Casting	13.70	13.75	13.75	13.75	13.75	13.75	13.75	13.75	13.75	13.80	14.00	14.00	14.00
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.....													
Prime Western	7.10	7.10	7.025	7.00	7.00	7.05	7.10	7.10	7.20	7.35	7.55	7.50	7.45
Brass Special	7.125	7.125	7.10	7.05	7.075	7.075	7.10	7.15	7.225	7.375	7.65	7.60	7.55
Tin (f. o. b. N. Y.) c/lb. Duty Free.....													
Straits	55.25	55.125	54.875	55.375	54.80	54.75	55.125	54.90	54.875	55.25	55.375	55.875	55.75
Pig 99%	54.625	54.50	54.375	54.875	54.30	54.125	54.50	54.25	54.25	54.625	54.75	55.25	55.125
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.....	8.75	8.75	8.70	8.70	8.80	8.90	8.90	9.15	9.40	9.45	9.80	9.80	9.65
Aluminum c/lb. Duty 5c/lb.	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb.													
Ingot	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
Shot	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Electrolytic	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00
Antimony (J. & Ch.) c/lb. Duty 2c/lb.....	14.00	14.50	14.50	14.50	14.50	14.50	14.50	14.375	14.25	14.125	14.125	14.125	14.125
Silver c/oz. Troy Duty Free	69.25	69.25	69.00	68.75	69.00	69.375	69.375	69.00	69.125	68.875	68.00	67.375	67.625
Platinum $/oz. Troy Duty Free 117		117	117	117	117	117	117	117	117	117	117	117	117

	18	19	22	23	24	25*	26	29	30	31	High	Low	Aver.
Copper (f. o. b. Ref.) c/lb. Duty Free.....													
Lake (Delivered)	14.75	14.75	18.00	15.00	15.00	.....	15.00	15.125	15.125	15.125	15.125	14.25	14.619
Electrolytic	14.45	14.50	14.65	14.65	14.75	.....	14.75	14.90	14.80	14.65	14.90	14.05	14.370
Casting	14.00	14.00	14.25	14.25	14.25	.....	14.25	14.40	14.40	14.30	14.40	13.70	13.982
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.....													
Prime Western	7.45	7.50	7.60	7.65	7.70	.....	7.70	7.80	7.85	7.85	7.85	7.00	7.392
Brass Special	7.55	7.55	7.65	7.70	7.75	.....	7.75	7.85	7.90	7.90	7.90	7.05	7.445
Tin (f. o. b. N. Y.) c/lb. Duty Free.....													
Straits	55.625	56.50	57.25	57.50	57.75	.....	58.125	59.00	58.875	58.625	59.00	54.75	56.208
Pig 99%	55.125	55.875	56.75	56.875	57.25	.....	57.50	58.375	58.25	58.00	58.375	54.125	55.616
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.....	9.70	9.70	9.70	9.85	9.85	.....	9.95	10.05	10.00	10.00	10.05	8.70	9.434
Aluminum c/lb. Duty 5c/lb.	28.00	28.00	28.00	28.00	28.00	.....	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb.													
Ingot	29.00	29.00	29.00	29.00	29.00	.....	29.00	29.00	29.00	29.00	29.00	29.00	29.00
Shot	30.00	30.00	30.00	30.00	30.00	.....	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Electrolytic	33.00	33.00	33.00	33.00	33.00	.....	33.00	33.00	33.00	33.00	33.00	33.00	33.00
Antimony (J. & Ch.) c/lb. Duty 2c/lb.....	14.125	14.25	14.875	15.875	16.50	.....	16.50	17.50	17.50	17.50	17.50	14.00	15.034
Silver c/oz. Troy Duty Free	67.875	67.75	67.75	67.25	66.875	.....	66.875	66.50	66.50	66.75	69.375	66.50	68.097
Platinum $/oz. Troy Duty Free 117		117	117	117	117	.....	117	117	117	117	117	117	117

*Holiday.

Metal Prices for January 12, 1925

Copper: Lake, 15.25. Electrolytic, 15.10. Casting, 14.625.
Zinc: Prime Western, 7.90. Brass Special, 7.95.
Tin: Straits, 59.50. Pig, 99%, 59.00.
Lead: 10.70. **Aluminum,** 28.00. **Antimony,** 17.50.
Nickel: Ingot, 31.00. Shot, 32.00. Electrolytic, Internat. Nick. Co., 38.00.
Quicksilver, flask, 75 lbs., $83.00. **Silver,** oz. Troy, 69.375.
Platinum, oz. Troy, $117. **Gold,** oz. Troy, $20.67.

Metal Prices, January 12, 1925

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	11 to12½
Brass Ingots, Red	12½to14
Bronze Ingots	12 to13
Bismuth	$1.30 to$1.35
Cadmium	50
Casting Aluminum Alloys	21 to24
Cobalt—97% pure	$2.50to$2.75
Manganese Bronze Castings	22 to40
Manganese Bronze Ingots	13 to16
Manganese Bronze Forging	34 to44
Manganese Copper, 30%	28 to45
Parsons Manganese Bronze Ingots	19¼to19¾
Phosphor Bronze	24 to30
Phosphor Copper, guaranteed 15%	19¼to21
Phospher Copper, guaranteed 10%	18½to20
Phosphor Tin, guaranteed 5%	65 to70
Phosphor Tin, no guarantee	65 to75
Silicon Copper, 10% ....according to quantity	28 to35

OLD METALS

Buying Prices		Selling Prices
12¾to13	Heavy Cut Copper	13¾to14¼
12½to12¾	Copper Wire	13½to14
10¾to11	Light Copper	12 to12½
9¾to10	Heavy Machine Comp	11¼to11¾
8 to 8¼	Heavy Brass	9 to 9½
7 to 7¼	Light Brass	8¼to 8½
8¼to 8¾	No. 1 Yellow Brass Turnings	9¾to10
8½to 9	No. 1 Comp. Turnings	10 to10½
8 to 8¼	Heavy Lead	8¾to 9
4¾to 5	Zinc Scrap	5¾to 6
10	Scrap Aluminum Turnings	12 to14
16 to17	Scrap Aluminum, cast alloyed	18 to19
20	Scrap Aluminum, sheet (new)	23 to25
32	No. 1 Pewter	36 to38
12	Old Nickel anodes	14
18	Old Nickel	20

BRASS MATERIAL—MILL SHIPMENTS

In effect Dec. 24, 1924

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.19⅜	$0.21⅛	$0.23⅛
Wire	.19⅞	.21⅝	.23⅝
Rod	.17⅜	.21⅞	.23⅞
Brazed tubing	.27⅛	.....	.32⅞
Open seam tubing	.27⅜	.....	.32⅞
Angles and channels	.30⅛	.....	.35⅞

To customers who buy less than 5,000 lbs. in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.20⅜	$0.22⅛	$0.24⅛
Wire	.20⅞	.22⅝	.24⅝
Rod	.18¾	.22⅞	.24⅞
Brazed tubing	.28⅛	.....	.33⅞
Open seam tubing	.28⅜	.....	.33⅞
Angles and channels	.31⅛	.....	.36⅞

SEAMLESS TUBING

Brass, 24c. to 25c. net base.
Copper, 25c. to 26c. net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	21⅜c. net base
Muntz or Yellow Metal Sheathing (14"x48")	19⅜c. net base
Muntz or Yellow Rectangular Sheet other Sheathing	20⅜c. net base
Muntz or Yellow Metal Rod	17⅜c. net base

Above are for 100 lbs. or more in one order.

COPPER SHEET

Mill shipments (hot rolled)	21¾c. to 24¼c. net base
From stock	22¾c. to 24¾c. net base

BARE COPPER WIRE—CARLOAD LOTS

17⅛s. to 17¼c. net base.

SOLDERING COPPERS

300 lbs and over in one order	21¾c. net base
100 lbs. to 200 lbs. in one order	22¼c. net base

ZINC SHEET

Duty, sheet, 15%.	Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 8 per cent discount	11.00 basis
Casks, jobbers' price	12.25 net base
Open Casks, jobbers' price	12.75 to 13.00 net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price	40c.
Aluminum coils, 24 ga., base price	36.70c.
Foreign	40c.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Nickel Silver Sheet Metal

10%	Quality	27 c.
15%	"	28¼c.
18%	"	29¼c.

Nickel Silver Wire and Rod

10%	"	30½c.
15%	"	34 c.
18%	"	37 c.

MONEL METAL

Shot	32
Blocks	32
Hot Rolled Rods (base)	40
Cold Drawn Rods (base)	48
Hot Rolled Sheets (base)	42

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 40 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 35 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over Pig Tin. 50 to 100 lbs., 15c. over, 25 to 50 lbs., 20c. over, less than 25 lbs., 25c. over. Above prices f. o. b. mill.

SILVER SHEET

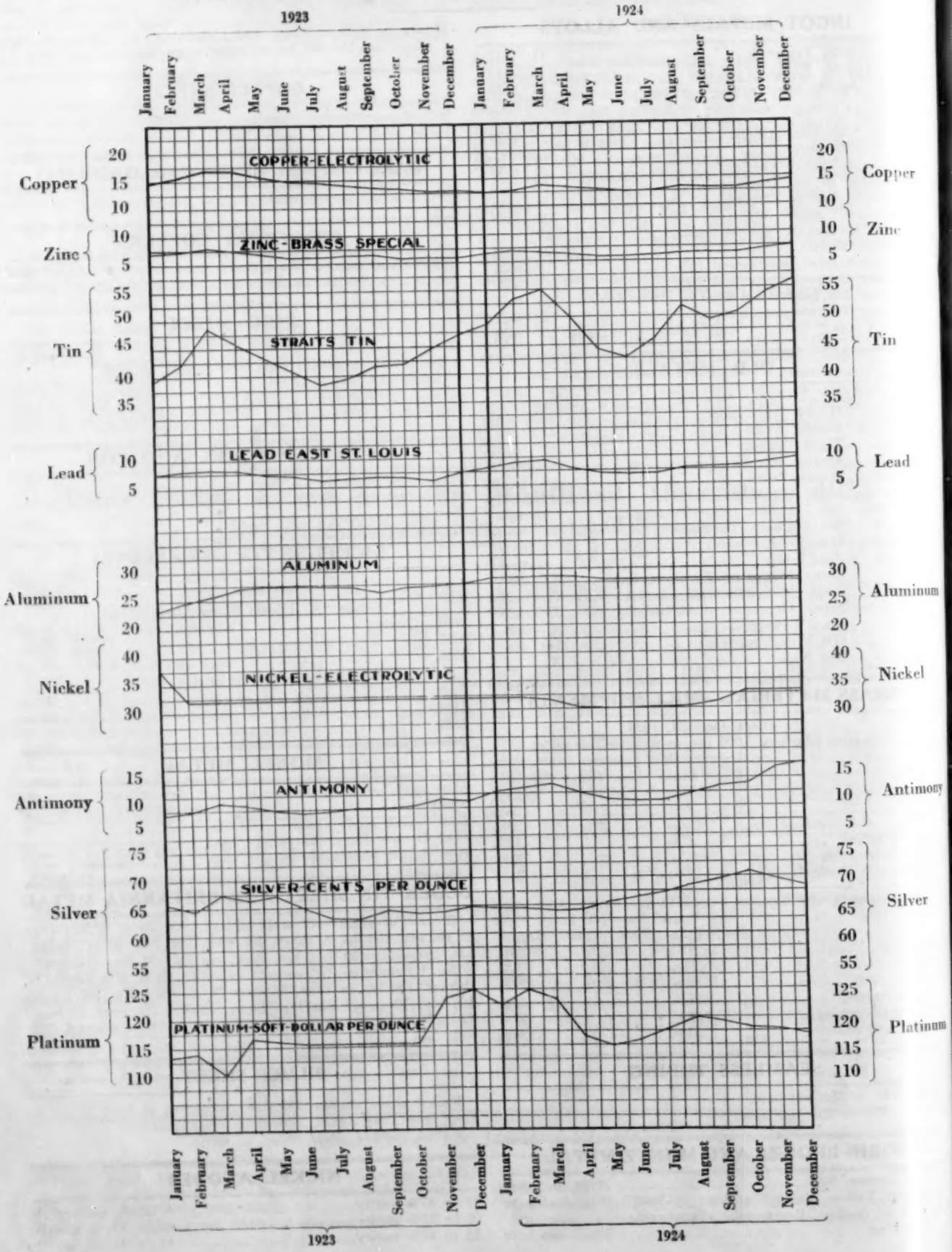
Rolled silver anodes .999 fine are quoted at from 69½c. to 71½c. per Troy ounce, depending upon quantity.

Rolled sterling silver 66¾c. to 68¾c.

NICKEL ANODES

85 to 87% purity	40½c.-42½c. per lb.
90 to 92% purity	43 c.-45 c. per lb.
95 to 97% purity	45 c.-47 c. per lb.

Chart of Metal Prices for 1923-1924



Pig Iron and Metal Products of the United States

Calendar Years 1915-1923. (1924 Estimated.)

(FROM THE UNITED STATES GEOLOGICAL SURVEY.)

PRODUCTS METALLIC	1915 Quantity	1915 Value	1916 Quantity	1916 Value	1917 Quantity	1917 Value	Products
Pig iron (spot value), long tons...	30,384,486	$401,409,604	39,126,324	$663,478,118	38,612,546	$1,053,785,975	Pig iron
Silver, commercial value, troy ounces.	74,961,075	37,397,300	74,414,802	48,953,000	71,740,362	59,078,100	Silver
Gold, coining value, troy ounces.....	4,887,602	101,035,700	4,479,056	92,590,300	4,051,440	83,750,700	Gold
Copper, value at New York, pounds..	1,388,009,527	242,902,000	1,927,850,548	474,288,000	1,886,120,721	514,911,000	Copper
Lead (refined) New York, short tons	507,026	47,660,000	552,228	76,207,000	548,450	94,333,000	Lead
Zinc, value at St. Louis, short tons (g)	458,135	113,617,000	564,338	151,243,000	584,597	119,258,000	Zinc
Quicksilver, value at S. Fran., flasks.	21,033	1,804,631	29,932	3,768,139	36,159	3,808,266	Quicksilver
Aluminum, pounds	*	16,280,000	*	33,900,000	*	45,882,000	Aluminum
Antimonial lead, short tons (F. & D.)	23,224	3,665,736	24,038	4,483,582	18,646	3,781,560	Antim. Lead
Nickel, value at New York, short tons	822	538,222	918	671,192	402	331,556	Nickel
Tin, (imports) short tons	102	78,846	140	122,000	110	135,600	Tin
Platinum, New York City, troy oz...	8,665	478,688	28,088	2,301,762	38,831	4,023,757	Platinum
Total value of metallic products (approximate) (b)		$991,730,000		$1,620,745,000		$2,086,234,000	

PRODUCTS METALLIC	1918 Quantity	1918 Value	1919 Quantity	1919 Value	1920 Quantity	1920 Value	Products
Pig iron (spot value), long tons....	38,230,440	$1,180,759,565	30,130,231	$775,915,043	35,710,227	$1,140,904,096	Pig iron
Silver, commercial value, troy ounces.	67,810,139	66,485,129	56,682,445	63,533,652	55,361,573	60,801,955	Silver
Gold, coining value, troy ounces	3,320,784	68,646,700	2,918,628	60,333,400	2,476,166	51,186,900	Gold
Copper, sales value, pounds.....	1,908,533,595	471,408,000	1,286,419,329	239,274,000	1,209,061,040	222,467,000	Copper
Lead (ref.) New York, short tons (h)	539,905	76,667,000	424,433	44,990,000	476,849	76,296,000	Lead
Zinc, sales value, short tons	492,405	89,618,000	452,272	66,032,000	450,045	72,907,000	Zinc
Quicksilver, value at S. Fran., flasks.	32,883	3,863,752	21,415	1,933,560	13,392	1,066,807	Quicksilver
Aluminum, pounds	*	41,159,000	*	38,558,000	*	41,375,000	Aluminum
Antimonial lead, short tons (F. & D.)	18,570	2,826,350	13,874	1,513,968	12,535	1,963,255	Antim. Lead
Nickel, value at New York, short tons	441	401,000	511	434,485	365	293,250	Nickel
Tin, (imports) short tons.....	69	118,500	56	73,400	22	22,000	Tin
Platinum and allied metals, value at New York City, troy ounces.....	59,753	6,417,980	45,109	5,614,335	41,544	4,697,722	Platinum
Total value of metallic products (approximate) (b)		$2,153,318,000		$1,359,744,000		$1,762,350,000	

PRODUCTS METALLIC	1921 Quantity	1921 Value	1922 Quantity	1922 Value	1923 Quantity	1923 Value	Products
Pig iron (spot value), long tons....	16,038,619	$389,437,792	27,670,738	$608,144,858	38,361,379	$946,799,378	Pig iron
Silver, commercial value, troy ounces.	53,052,441	53,052,441	56,240,048	56,240,048	73,335,170	60,134,839	Silver
Gold, coining value, troy ounces	2,422,006	50,067,300	2,363,075	48,849,100	2,502,632	51,734,000	Gold
Copper, sales value, pounds.....	505,586,098	65,221,000	950,285,947	128,289,000	1,434,999,962	210,945,000	Copper
Lead (refined) sales value, short tons	398,222	35,840,000	468,746	51,562,000	543,841	76,138,000	Lead
Zinc, sales value, short tons	198,232	19,823,000	353,274	40,273,000	508,335	69,134,000	Zinc
Quicksilver, value at S. Fran., flasks.	6,339	300,595	6,375	368,348	7,937	521,302	Quicksilver
Aluminum, pounds	*	10,906,000	*	13,622,000	*	28,305,000	Aluminum
Antimonial lead, short tons (F. & D.)	10,064	870,059	8,075	844,993	14,190	1,950,370	Antim. Lead
Nickel, value at New York, short tons	111	86,000	208	133,191			Nickel
Tin, (imports) short tons.....	4	2,400	3,800	912	77,166	60,786,662	Tin
Platinum and allied metals, value at New York City, troy ounces.....	56,370	4,238,989	57,718	5,860,525	49,797	5,800,155	Platinum
Total value of metallic products (approximate) (b)		$654,130,000		$987,180,000		$1,498,200,000	

1924 ESTIMATED†	Quantity	Value Total	Value Per Unit
Pig iron (spot value), long tons	31,100,000	$699,750,000	$22.50 ton (a)
Silver, commercial value, troy ounces	64,790,000	43,266,762	66.78c. oz.
Gold, coining value, troy ounces	2,511,243	51,907,393	$20.67 oz.
Copper, sales value, pounds	1,764,000,000	229,672,800	13.02c.lb.(c)
Lead (refined) sales value, short tons	591,000	94,560,000	8c.lb.(d)
Zinc, sales value, short tons	516,000	65,428,800	6.34c.lb.
Quicksilver, value at S. Fran., flasks	9,500	662,625	$69.75 flask
Nickel, value at New York, short tons (Canadian)	12,900	7,224,000	28c.lb.
Tin (imports) short tons	74,500	74,500,000	50c.lb.

(†) Figures from Engineering and Mining Journal.
(b) Includes some items of minor interest to metal trades not shown in table.
(*) Survey not at liberty to publish figures.
(a) Bessemer. (c) New York. (d) St. Louis.
(g) Beginning with 1915, value based on average sales price.
(h) Beginning with 1917, value based on average sales price.

Supply Prices, January 12, 1925

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.12–.16
Acid—		
Boric (Boracic) Crystals	lb.	.12
Hydrochloric (Muriatic) Tech., 20°, Carboys	lb.	02
Hydrochloric, C. P., 20 deg., Carboys	lb.	.06
Hydrofluoric, 30%, bbls	lb.	.08
Nitric, 36 deg., Carboys	lb.	.06
Nitric, 42 deg., Carboys	lb.	.07
Sulphuric, 66 deg., Carboys	lb.	.02
Alcohol—		
Butyl	lb.	.26–.32
Denatured in bbls	gal.	.60–.62
Alum—		
Lump Barrels	lb.	.04
Powdered, Barrels	lb.	.04½
Aluminum sulphate, commercial tech	lb.	.02⅜
Aluminum chloride solution in carboys	lb.	.06½
Ammonium—		
Sulphate, tech., bbls	lb.	.03¾
Sulphocyanide	lb.	.65
Argols, white, see Cream of Tartar	lb.	.27
Arsenic, white, kegs	lb.	.16
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate), bbls	lb.	.05½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls	lb.	.36
Cobalt Chloride	lb.	—
Copper—		
Acetate	lb.	.37
Carbonate, bbls	lb.	.17
Cyanide	lb.	.50
Sulphate, bbls	lb.	.05¼
Copperas (Iron Sulphate, bbl.)	lb.	.01½
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar Crystals (Potassium bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05–.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$75.00
Fusel Oil	gal.	$4.50
Gold Chloride	oz.	$14.00
Gum—		
Sandarac	lb.	.26
Shellac	lb.	.59–.61
Iron, Sulphate, see Copperas, bbl	lb.	.02
Lead Acetate (Sugar of Lead)	lb.	.13
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.15
Nickel—		
Carbonate Dry	lb.	.40
Chloride, 100 lb. lots	lb.	.22½
Salts, single bbls	lb.	.10½
Salts, double bbl.	lb.	.10
Paraffin	lb.	.05–.06
Phosphorus—Duty free, according to quantity		.35–.40
Potash, Caustic Electrolytic 88-92% fused, drums	lb.	.08¾
Potassium Bichromate, casks	lb.	.08¾
Carbonate, 80-85%, casks	lb.	.05¾
Cyanide, 165 lb. cases, 94-96¾	lb.	.60
Pumice, ground, bbls	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls	lb.	.03
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.08
Silver Chloride, dry	oz.	.86
Cyanide (Fluctuating Price)	oz.	.70
Nitrate, 100 ounces lots	oz.	.48
Soda Ash, 58%, bbls	lb.	.02½
Sodium—		
Biborate, see Borax (Powdered), bbls	lb.	.05½
Cyanide, 96 to 98%, 100 lbs.	lb.	.70
Hyposulphite, kegs	lb.	.04
Nitrate, tech., bbls	lb.	.04¾
Phosphate, tech., bbls	lb.	.03½
Silicate (Water Glass), bbls	lb.	.02
Sulpho Cyanide	lb.	.45
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.13
Sulphur (Brimstone), bbls	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.41
Tripoli, Powdered	lb.	.03
Verdigris, see Copper Acetate	lb.	.37
Water Glass, see Sodium Silicate, bbls	lb.	.02
Wax—		
Bees, white ref. bleached	lb.	.55
Yellow, No. 1	lb.	.35
Whiting, Bolted	lb.	.02½–.06
Zinc, Carbonate, bbls	lb.	.13–.17
Chloride, 600 lb. lots	lb.	.07
Cyanide	lb.	.41
Sulphate, bbls	lb.	.03½

COTTON BUFFS

Open buffs, per 100 sections (nominal),

12 inch, 20 ply, 64/68, cloth	base,	40.85
14 inch, 20 ply, 64/68, cloth	base,	50.80
12 inch, 20 ply, 84/92, cloth	base,	46.20
14 inch, 20 ply, 84/92, cloth	base,	62.25
12 inch, 20 ply, 88/96, cloth	base,	63.25
14 inch, 20 ply, 88/96, cloth	base,	85.15

Sewed Buffs, per lb., bleached and unbleached base, .65 to .75

FELT WHEELS

		Price Per Lb. Less Than 100 Lbs.	300 Lbs. and Over
Diameter—10" to 16"	1" to 3"	$3.00	$2.65
" 6" 8" and over 16"	1" to 3"	3.10	2.75
" 6" to 24"	Over 3"	3.40	3.05
" 6" to 24"	½" to 1"	4.00	3.65
" 4" to 6"	¼" to 3"	4.85 }	Any quantity
" Under 4"	¼" to 3"	5.45 }	

Grey Mexican or French Grey—10c. less per lb. than Spanish, above.

FELT WHEELS

	6" to 18"	Over 18"	Under 6"
Over 3"	$2.90	$3.20	$3.75
1" to 3"	2.40	2.60	3.75
Under 1"	3.20	3.50	3.75

25 to 99 pounds ..... 10c. per lb. discount
100 pounds and over ..... 20c. per lb. discount
Odd Size Diameter—25c. per lb. advance.